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AIR CORPS NEWS LETTER

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WAR DEPARTMENT AUGUST 1, 1939. WASHINGTON, D.C.
VOL. XXII NO.15

WAR DEPARTMENT
WASHINGTON

July 17, 1939.

Major General H. H. Arnold,

Chief of the Air Corps.

Dear General Arnold:

In response to your letter of July 1, I am pleased to enclose a statement for publication in the AIR CORPS NEWS LETTER in its issue commemorating the 30th anniversary of the delivery of the first military airplane to the United States Army.

On this occasion I take pleasure in congratulating you and the Army Air Corps for the advancement and splendid achievements which have been attained during those thirty years.

Sincerely yours,

Harry H. Woodring

Secretary of War.

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U. S. ARMY AIR CORPS 30TH ANNIVERSARY ISSUE

VOL. XXII A I R C O R P S N E W S L E T T E R NO. 15.
Information Division Munitions Building
Air Corps August 1, 1939 Washington, D.C.

The chief purpose of this publication is to distribute information on aeronautics to the flying personnel in the Regular Army, Reserve Corps, National Guard, and others connected with aviation.

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STATEMENT FOR AIR CORPS NEWS LETTER, AUGUST 1, 1939,
By
THE SECRETARY OF WAR, THE HONORABLE HARRY H. WOODRING.

On August 2, 1909, thirty years ago tomorrow, the Army received its first airplane. Its acceptance at that time was not heralded as the arrival of a new weapon for the Army but rather as a new means of communication and an aid to better observation.

Today, after thirty years of development, pioneered to a large extent by our armed forces, we find the airplane one of the most potent offensive weapons available to modern armies and an integral part of the inland and oceanic peacetime transportation systems of the country.

Because of its long range, its tremendous striking power, its speed and its all-round mobility, we look upon our air force as a first line of defense which may be counted upon to make an enemy position or base within striking distance of our shores or borders extremely untenable while our naval forces are given that freedom of action which will enable them to seek out and destroy the hostile fleet.

Thus we have at our disposal the means for initiating a truly protective campaign against any threatened invasion at the very beginning of such an eventuality. The ground forces can, therefore, be more assured of that vital element of time in which to concentrate for their offensive action and the delivery of the telling blow.

With the increase in the number of planes, the augmented personnel, the added impetus given to the training of new pilots, and the general provisions for the expansion of bases and other facilities now appropriated for, we may look forward with confidence to the fulfilment of our plans.

There can be no doubt that during this augmentation the Air Corps and the aeronautical industry of the United States will continue to progress and to accelerate greatly their experimental and development work to an extent that will give to the Army a class of equipment far excelling in speed, endurance, efficiency and combat ability those now in use by our air forces or any that may be employed against us by other powers.

The ground work, looking to the fruition of our present plans, has been laid with care over the period of years that has elapsed since that day in August, 1909. It has been a slow and painstaking job, and one fraught with many disappointments, yet every year has seen some progress and, without doubt, the past few years have brought about the greatest and most far-reaching developments in the history of military and civil aviation.

During these later years also there has crystalized in the minds of military leaders and in the minds of the people the true worth of the airplane and the proper stature and mission of the air force in our conception of a national defense team.

It has been my great pleasure to have been intimately associated with the Air Corps during the past six years, in its period of greatest development, and I am happy indeed to say that upon the completion of the present augmentation program, the nation will possess a balanced air force fully capable of performing its every mission in our scheme of national defense.

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GREETINGS FROM THE ASSISTANT SECRETARY OF WAR.

July 7, 1939.

To the Officers and the Enlisted Men
of the Air Corps, U.S. Army.

Gentlemen of the Air Corps:

You are a living memorial to the pioneers of the air who, thirty years ago, had the courage, the perseverance and the foresight to insist upon the purchase of "one heavier-than-air machine for military purposes." These same sterling qualities you have fostered and maintained and as a result you have an Air Corps today that holds the respect of military leaders of all branches of the Service, the admiration of the entire world and the affection of the American people.

You have succeeded because you have always been dynamic rather than static. Every achievement of your pilots and your engineers merely served to stimulate your interest and your determination for greater and more useful developments. I commend you for your pioneering spirit in the whole realm of aviation.

I am especially grateful to you for your wholehearted co-operation in the realization of our present aviation program. You worked loyally and faithfully, day and night, Sundays and even holidays, without any regard for time. The cause of national defense in the Air Corps, you have advanced many fold and I am confident that all friends of a prepared America join me in paying you the homage you so well deserve.

Ever faithful to the lofty traditions of the Service, you have become a pillar of strength in the destiny of your country. Carry on!

Faithfully yours,

LOUIS JOHNSON

The Assistant Secretary of War.

OUR ARMY AIR CORPS AND ITS FUTURE

By Major General Henry H. Arnold, Air Corps
Chief of the Air Corps

On August 2, 1909, the Chief Signal Officer of the Army approved the findings of a Board of Officers of the Army Signal Corps, recommending the acceptance of the Army's first airplane.

A goodly number of the oldtimers of that day are still living, but it is with a tinge of sadness that I think of your friend and mine, Colonel Charles deF. Chandler, who passed away on May 17, 1939. Colonel Chandler, then a Captain, was a member of that Board and was intimately connected with Army aviation from that day until his death. Since his retirement in 1920, he has made his home in Washington, and he has helped all of us with his counsel and his historical knowledge.

Since the acceptance of that first flying-machine for our Army - and for any army for that matter - we have been going constantly forward. I feel that I can speak with some authority on this subject, not only because of my position as Chief of the Air Corps, but because I am one of that generation of oldtimers who learned to fly during the first couple of years following the purchase of that first plane. This is by no means a historical narrative, nor is it a chronology of happenings during these thirty years, but I cannot help looking back a bit wistfully before contemplating the future.

A question which has often been asked me is: "Who was the first Army officer to fly alone in an airplane?" Some know, but most people do not. It was First Lieutenant Thomas E. Selfridge, Field Artillery, U.S. Army, in whose memory Selfridge Field, Mt. Clemens, Mich., was named. While the Wright Brothers, Wilbur and Orville, were demonstrating their plane at Fort Myer, Virginia, in 1908, and giving flying instruction to several officers, Lieut. Selfridge flew alone on August 2, 1908, for one minute and 30 seconds. This happened exactly one year before the recommendation was approved for the purchase of the Army's first airplane. Moreover, this was before any army or any military force in the world had a plane. Everyone was saddened by the death of Lieut. Selfridge which occurred on September 17, 1908. He was making a flight with Orville Wright when a brace wire snapped, causing the breakage of one of the propellers and the machine to crash. Selfridge was killed and Mr. Wright was severely injured.

But after we received our first plane, a Wright, on August 2, 1909, who was the first Army man to solo it? The honor was equally divided between two lieutenants of the Regular Army - Frederick E. Humphries and Frank P. Lahm. The former is now a Colonel of the New York National Guard and the latter is a Colonel in the Air Corps, Regular Army. Colonel Lahm has the distinction of being the first Commanding General of the Air Corps Training Center, and during his tenure of this position for a period of four years from July 17, 1926, he held the rank of Brigadier General.

On October 26, 1909, Humphries made a solo flight of three minutes, followed immediately by Lahm, who also flew alone for thirteen minutes. On that same day at our Flying School at College Park, Md., each of these officers made two more solo flights. That proved that they were deserving of the honor, for at the end of the day the flying-machine was undamaged. Another officer who soloed shortly thereafter was Lieut. Benjamin D. Foulois, who later served with distinction as Chief of the Air Corps with the rank of Major General. Colonel Roy C. Kirtland, then one of the senior officers of that group of early flyers, commanded the College Park School, and only recently - in May 1939 - was retired from active service. Lieut. Colonel Stephen J. Idzorek, Air Corps, who is to retire from active service this summer, was one of our noncommissioned officers of those days, as was Lieut. Colonel Vernon L. Burge. Colonel Thomas DeWitt Milling, who retired in July, 1933, was one of the charter members of the "Early Birds." He is affectionately known as "Tommy" by his host of friends. He and I learned to fly together at the Wright Brothers School at Dayton, Ohio, in 1911.

From my memory and personal notes, the following officers and enlisted men, aside from those previously mentioned, performed solo flights in the order in which their names are mentioned:

Lieut. Frank M. Kennedy, Corporal Vernon L. Burge, Lieuts. Lewis H. Brereton, Herbert A. Dargue, Sergeant William C. Ocker, Lieuts. Byron Q. Jones, Douglas B. Netherwood, Walter G. Kilner, Shepler W. FitzGerald, Henry W. Harms, Ira A. Rader, Harrison H.C. Richards, John F. Curry and Ralph Royce. Of these early flyers, the then Lieuts. Dargue and Kilner now hold the rank of Brigadier General in the Air Corps, while the remainder hold either the rank of Colonel or Lieut. Colonel.

One writing a sketch of Army Aviation from its very inception would be guilty of a grave omission were he to neglect to mention the name of one individual who literally grew up with this branch of the service. He is Mr. John J.

Mullaney, who has been Chief Clerk of the Air Corps since it started out on its own - when it was separated from the Signal Corps. Mr. Mullaney began his service with the War Department back in 1905 in the Office of the Chief Signal Officer of the Army, and when the Aviation Section of the Signal Corps was established he was assigned to duty in that Section and has been "in" on every event that transpired in Army aviation ever since. During the time the first Army airplane was under consideration he wrote part of the contract entered into with the Wright Brothers.

The first annual appropriation to be made for military aviation was not provided until 1911. The amount of $125,000 set aside for this purpose was then considered quite large. In connection with this, it must be remembered that in 1898 the Board of Ordnance and Fortifications contributed two amounts of $25,000 each to Professor Langley for his flying experiments. And, of course, there was specifically made available the sum of $25,000, plus a bonus of $5,000, to pay the Wright Brothers for our first airplane.

The Aviation Section of the Signal Corps was not created until July 18, 1914. By April 6, 1917, on which day we entered the World War, Army aviation consisted of 65 officers (of whom only 35 were pilots), less than 1100 men and 55 planes.

The story of the war flying has been told adequately by others many times. There were brilliant successes. Our officers and men were second to none in the world in courage and ability. At first we had to use European airplanes for our flyers. Our industry, however, did promptly and efficiently produce the Liberty engine, and it was a good one for those days. Contracts for 5,000 DeHavillands were let in September, 1917, and, with all available manufacturers working at top speed, they together turned out only 155 by May, 1918, - a period of eight months. On that date, 49 of these had been shipped overseas.

The recital of these statistics is rather dry reading, to be sure, but the lesson which we draw from them certainly gives us a jolt - or it should. It shows us that we were unprepared to produce aviation equipment. The production figure of but 155 airplanes in a period of eight months shows that we were unprepared to produce aviation equipment, despite unlimited funds and the most frenzied efforts.

In man power we had mushroomed to 18,000 officers and 135,000 enlisted men at the time of the Armistice. This strength was rapidly reduced to about 1,000 officers and 10,000 men on June 30, 1921, and August 21, 1920, respectively.

When that memorable day - November 11, 1918 - arrived, the Allies dictated the terms, but the number of American-built planes sent to the front had little to do with the favorable result. We were unprepared, and no amount of money or effort could produce good equipment in a short time.

The Congress has just followed the wisdom of the President's recommendations of January 12th, last. Among other things, the Commander-in-Chief said:

"Military aviation is increasing today at an unprecedented and alarming rate. Increased range, increased speed, increased capacity of airplanes abroad have changed our requirements for defense aviation."

Just what will that mean to National Defense, insofar as the Air Corps is concerned, within, say, a couple of years? We have been provided a supplemental appropriation of $300,000,000. In our program of expansion we considered not only the necessary number of airplanes but also the other phases which will give a well rounded plan. What are they? In addition to planes, we must have pilots and combat crews to operate them, mechanics to maintain them, and air bases with suitable buildings and equipment with which and from which to conduct flying operations.

It is expected that our present airplane strength will be increased to a minimum of 5,500. The actual number will depend on the proportion of the different types procured. About 3300 of these will be active planes, and 2,000 of them will be combat types. The aircraft industry has gladly accepted the job of producing them. We think that many of the types will be the best in the world. But our future superiority which we have or may secure will be largely due to the provision of funds for experimental work. We have $10,000,000 for all experimental development purposes for this fiscal year.

Our main task, then, is to secure and train the necessary personnel, both officers and enlisted men. Our officer personnel of the Regular Army will be increased about 90% in the next ten years. Our enlisted personnel will be increased through increments prior to July 1, 1940, to 45,000. This year we shall commission about 400 officers from qualified Air Corps Reservists. For the next nine years, about 130 per year, plus those required for attrition, will be added. Reserve pilots will be ordered to active duty to fulfill our requirements. At first there will be more Reserves than Regulars, but later the proportions will be reversed.

Randolph and Kelly Fields do not have the capacity for the necessary increase

(Continued on Page 36)

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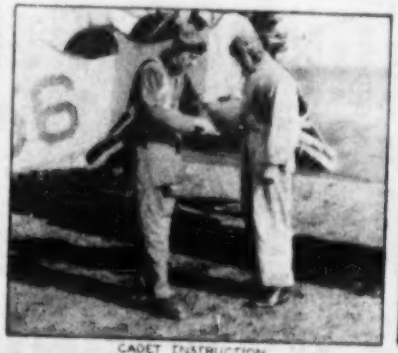

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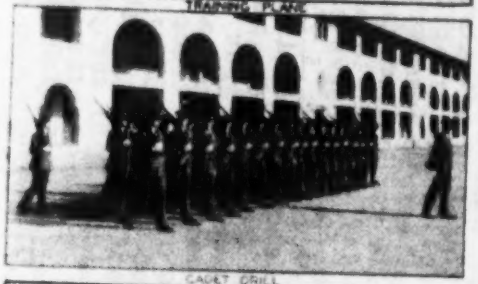
CADET AREA

CADET ADMINISTRATION

TRAINING PLANE

RANDOLPH FIELD TEXAS

TRAINING PLANE



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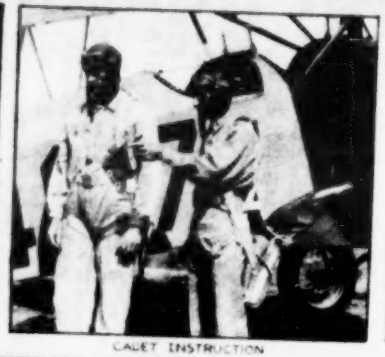


CADET INSTRUCTION

OFFICER'S CLUB

THE AIR CORPS TRAINING CENTER

From that memorable day at College Park, Maryland, in October, 1909, when two young Lieutenants of the United States Army received their first instruction in the art of flying an airplane, to the present when classes of Flying Cadets, numbering more than 300 men, enter the Air Corps Primary Flying School at Randolph Field, Texas, at least three times per year, training activities in Army Aviation have progressed.

Lieutenants Frank P. Lahm and Frederick E. Humphreys were the first flying students and they were the pupils of the inventors of the airplane themselves, the Wright brothers. Among the first five military airmen came Lieut. Henry H. Arnold, now Major General and Chief of the Air Corps. In the footsteps of these Army officer pioneers, thousands of student pilots have followed toward the goal of a highly coveted pair of wings and the title,"Airplane Pilot, United States Army Air Corps".

Training of pilots for the "Flying Fortresses," the P-36's, and the O-47's has gone a long way since that day in the fall of 1909, when the rickety craft of bamboo and wire carried aloft its first student, but ever since that first day, the Army has pioneered in the art of flying and flight training.

Today a monument has arisen to the memory of those who have gone before, a monument whose stature, unlike images from stone, continues to grow, to expand, to create. The Air Corps Training Center, Randolph Field, Texas, stands as the ultimate in aviation training, not only in this nation, but throughout the world. It is a creator out of whose efforts flow in a continual stream the cream of American youth with a highly technical education, obtainable only at this institution.

With the exception of a short period of time immediately following the hectic days of demobilization in the fall of 1918, flight training has been conducted continuously from October, 1909, to the present day. Many airdromes have been utilized in the schooling of pilots for the Air Corps, ranging from College Park, Maryland, through the maze of 31 flying fields utilized at the peak of wartime training, and Brooks and March Fields during the post war period, finally reaching the acme in the present-day organization of the Air Corps Training Center which consists of the Primary Flying School at Randolph Field and the Advanced Flying School at Kelly Field. And the present-day organization and size of the Training Center are about to be further augmented, for, as press dispatches report, some ten to fifteen civilian flying schools may, in the near future, be included in the picture as Primary Flying Schools, making Randolph Field the Basic Flying School.

To an ever-increasing number of Air Corps officers, the Training Center is assuming the role of Alma Mater in their lives. Officers of the line branches, upon graduation from the Military Academy, are sent to duty with one of the basic branches. Their education in that branch has been received while still cadets. Later they receive instruction at one of the branch schools, but fundamentally they look upon West Point with fond remembrances as their Alma Mater.

Not so with the Air Corps. Allegiance, by virtue of the completely new field they entered, must be sworn to the Air Corps Training Center; not because it is demanded, but because it is given freely. In one short year, the student aviator's vistas are broadened, new concepts are formed, thought is stimulated. A surge of mastery crashes upon his sensibilities as he completely dominates earth-bound peoples from his perch of freedom.

The Air Corps becomes his life - his whole existence - and to the birthplace of this new-found life, the Air Corps Training Center, it is only natural that he pay undying tribute and allegiance.

Every officer in the Air Corps today has recounted time and time again the story of his first solo flight. Some made their first venture into the air at San Diego, Calif., back in 1915, when the potentialities of aviation were still a far-fetched dream. Others soloed during the War at numerous flying fields, from New York to Florida. Still others, while students at the present Primary Flying School, received that pat on the back and heard dimly over the rush of blood in their ears, the time-worn phrase, "All right, take it around by yourself a couple of times."

And suddenly they were alone, more alone than they had ever been before. The training plane took on all the aspects of a roaring, flame-spitting monster. Their breath came fast, the palms of their hands were wet with perspiration. A vise-like grip held the controls as the plane raced along at speeds never before attained. Then came the landing... Their craft sped down--the ground sped up. Suddenly, after ages of time, it was over. They had soloed!!

Those memories can't be erased by the passage of time. They are indelibly etched into the memory of every pilot,

whether the class of 1909 or 1939. Small wonder that the Air Corps training schools of the past and present replace all others as "Alma Mater" for every Air Corps pilot.

Graduates of the Air Corps system of flight training can be found today in practically every civilized country of the world, plying the profession taught them by the United States Army.

Supplies and mining equipment are being ferried by air daily into distant reaches of the South American jungle. Who are the pilots?-- graduates of the Air Corps Training Center. Journeys that formerly were reckoned in days and weeks are now being counted in terms of minutes, because the airplane, manned by former Air Corps pilots, is no respecter of tangled, matted undergrowth.

In the Philippine Islands, an airline is being operated with American-made flying equipment, owned and managed by graduates of the Air Corps Training Center; their pilots--graduates of the Air Corps Training Center.

A military mission is now on duty in the Argentine, advising the South American country on matters pertaining to military aviation. Members of the mission?-- graduates of the Air Corps system of flight training.

An aerial exploration expedition soars over the barren wastes of Southwest Asia, mapping, reconstructing traces of a long-lost civilization. The pilots?--more graduates--more living monuments to the Air Corps system.

Airlines reach into the far corners of the frozen north, into the jungles of South America, across the oceans to Europe, to Asia. Luxury planes span the United States in hours every day of the year. The pilots?--still more products of the Air Corps flying schools.

An American-made plane circles the world in the unheard of time of less than four days. Contributing largely to the ultimate success--an Air Corps Training Center graduate was its navigator and co-pilot.

A "Lone Eagle" sets the world aflame with the most heroic and breath-taking flight ever performed by man--a thirty-three hour struggle against wind and weather, a nonstop flight from New York to Paris--kings and presidents pay respectful homage--to a product of the United States Army Air Corps.

The listing of notables in the fields of aviation who owe their start to their baptism by the Air Corps can run on indefinitely. Presidents of large aviation manufacturing companies, vice-presidents and other executives, former heads of the Bureau of Air Commerce, chiefs of foreign flying schools, airline pilots, executives, the unsung heroes, design engineers hidden behind their drafting boards, test pilots, commercial flying school instructors-- all have tucked away in their memories a record of their experiences while learning the art of flying under the tutelage of Air Corps instructors.

No saga of the flying schools would be complete without a historical resume. Shortly after the initial establishment of College Park as the military aviation center in 1909, a winter school was decided upon, Augusta, Georgia, being selected. Training was carried on intermittently, halting when a crash landing disabled the meager flying equipment of the day. College Park was used during the summer, the planes being loaded on to trains for the southward trek for winter training.

This went on until the summer of 1913, when an auxiliary school was opened at San Diego, California. Seven airplanes, forty-seven enlisted men and twelve student officers undergoing training was the extent of the school. Eleven pilots had qualified up to that time at all schools and only six of them were active, one having been killed and four others were serving in other branches of the service.

Progress was pitifully slow during the next two years, a dearth of applicants for flight training being only one of the worries. In fact, in December, 1916, seven years after the first solo flight by an Army officer, the total commissioned personnel in the aviation section numbered only fifty-three. This number increased to sixty-five by the outbreak of the War the following April, with an additional eighty-five students undergoing training at that time at two schools--San Diego, California, and Mineola, Long Island, New York.

Training stations sprang up like mushroons during the hectic war training period. The south and southwest were favored as locations for these schools, due principally to the climate which favored year-round training. At the peak of wartime activity, a total of thirty-one training fields were being operated, most of them primary schools, with a few schools which specialized in advanced training in either bombing or gunnery.

In the one short year, plus a few days, from April 6, 1917, the day war was declared, to May 23, 1918, more than 4,000 Reserve Military Aviators had been trained, compared with the 85 pilots trained during the previous twelve-month period.

Flight training also was conducted at foreign schools overseas during this period. A total of 1,853 pilots grad-

AIR CORPS TRAINING CENTER RANDOLPH FIELD, TEXAS.

ADJUSTING PARACHUTE LEG STRAPS

FLYING CADETS DO NOT APPEAR "MIKE SHY"

DUAL INSTRUCTION

FLYING CADETS RECEIVING FLIGHT ORDERS

STARTING OFF ON TRAINING FLIGHT

uated from the French schools alone, 316 from English training centers, and 126 completed the Italian course of flight training.

With the signing of the Armistice on November 11, 1918, all pilot training came to an abrupt halt. After the first hurried siege of demobilization, operations of primary flying fields were resumed on a greatly reduced scale. This short period of time, measured in weeks, marks the only period in the history of the United States Army Air Corps from 1909 to 1939 that a training school for pilots was not in active operation.

Post-war training activities went along in a more or less haphazard manner during 1919. A careful study of aviation and its part in the World War showed that this new arm was destined to take its place alongside the line branches in importance, and that a definite long range policy of personnel training was necessary.

Carlstrom Field, Florida, and March Field, California, were selected as the Primary Flying Schools in this program. Four months were to be spent at either of the Primary Schools, three months at one of the several advanced schools, and a final three-month period was to be spent in a tactical organization. Only three types of specialization had come into being at this time. Rockwell Field, California, was designated as the Pursuit School; Ellington Field, Texas, as the Bombardment School; and Post Field, Fort Sill, Oklahoma, as the Observation School. At these stations the intermediate portion of the training was conducted. Attack aviation, as it is known today, had no formal place in the organization of the Air arm at that time.

Thus was born the basis of all post-war training, a foundation constructed so solidly that the essentials of the system are in effect to the present. With the increase in the complexities of the airplane, certain modifications in the original plan had to be made, but the fundamentals of the two training schools, the Primary and Advanced Schools, are still the basis of the present-day organization.

On June 28, 1922, all Primary training activities were consolidated at Brooks Field, Texas, and all advanced schools were brought together at Kelly Field. The Air Corps Training Center had come into being in everything but name with this consolidation of effort. Training was coordinated for the first time, the two schools being only seven miles apart now instead of separated by a span of the entire continent. The formal designation of the Training Center was still four years away, however.

Due to the lack of facilities at Brooks Field for turning out enough pilots to meet the demands of the rapidly growing Air Service, March Field was reopened as a Primary Flying School on June 15, 1927, sharing the burden of primary training until the final consolidation at Randolph Field was made in October, 1931.

Thus, with the creation of the Primary and Advanced Flying Schools in the vicinity of San Antonio, in 1922, did the South Texas community begin to assume the title it now holds without dispute, "The Mother-in-Law of the Air Corps."

During the summer of 1926, the Training and Operations Division, Office of the Chief of the Air Corps, decided that a more satisfactory coordination of flying training would be possible if a single representative head for such activities were created and physically located in San Antonio, the hub of the aviation training program. Therefore, on August 16, 1926, the Air Corps Training Center was created. Headquarters was established at Duncan Field, near both Brooks and Kelly Fields. The first morning report of the Training Center was dated September 1, 1926. Entirely fitting was the fact that the first head of all training activities that in future years was to create thousands of highly trained military pilots was none other than Brigadier General Frank P. Lahm, one of the pioneer aviators of the Air Corps, among the first Army officers to learn to fly.

Four years later, after a highly successful tour, General Lahm relinquished command to Brigadier General Charles H. Danforth, who also served a four-year tour. Brigadier General James E. Chaney headed the Training Center from May 17, 1935, to July 16, 1938. Brigadier General Barton K. Yount directed its activities from August 4, 1938, to January 25, 1939, when he was transferred to Washington to head all the training of the Air Corps. Colonel A.W. Robins assumed command on March 1, 1939.

A history of Randolph Field, the present multi-million-dollar home of the Air Corps Training Center Headquarters and the Primary Flying School is a story in itself. Shortly after March Field was reconstituted as a Primary Flying School in 1927, the problems of coordinated training became so complex that some solution was sought. Also, no degree of permanency was to be found in these training schools. Brooks, March and Kelly Fields were wartime emergency fields, with temporary buildings designed for emergency occupation. They had already outlived their usefulness, yet no provisions had been made for their

replacement with something that would endure.

A nation-wide search for a suitable location for the contemplated modern training school was started. The possibilities were narrowed down to Texas, and finally to the vicinity of San Antonio. A board of offiers appointed was to work in conjunction with the city fathers. Numerous sites were examined but found wanting in one degree or another. A 2,300-acre plot of level ground, 17 miles northeast of San Antonio was finally selected, and on August 18, 1928, the ground where now stands Randolph Field was formally turned over to the Government.

Plans already had been formulated and approved for the super-Flying School, so that within two months after the final acceptance of the property, the work of changing former farmsteads into a mammoth military airdrome was under way.

Dedication of the partially completed Randolph Field was held on June 30,1930, when more than 10,000 persons paid tribute to the memory of Captain William M. Randolph, a native of Austin, Texas, who was killed when his plane crashed slightly more than two years previously.

Occupation of Randolph Field started in the early fall of 1931, when the advance guards of organizations from both March and Brooks Fields reported to the new station. The mass transfer of the two primary flying schools, all their flying equipment, ground materiel and personnel, was accomplished during the month of October, 1931 and, on October 25th of that year, the present Air Corps Primary Flying School officially came into being.

The consolidated strength return of the Primary Flying School for October 31, 1931, shows that on that date thirteen organizations and detachments, composed of 162 officers and 1,432 enlisted men were at Randolph Field. The Air Corps Training Center Headquarters also moved into its new offices at Randolph Field during the month of October, and on the last day of the month reported that their strength was four officers and eighteen enlisted personnel. Today the strength of the two units remains fundamentally the same, although slight increases have been made from time to time. Including the dependents of officers and enlisted men, civilian employees, etc., the total population of Randolph Field today is well over 3,000 persons, with an increase expected when the Air Corps expansion program gets under way.

Kelly Field now has a population of approximately 2,000 persons, still has its wartime structures, its mellowed atmosphere, its splendid morale. In a year or two, that station will present an entirely new aspect, for appropriations for its partial reconstruction have arrived and workmen are erecting the first of the buildings of the new post.

No history of the Air Corps Training Center would be complete without reporting on the School of Aviation Medicine, an organization that is playing an ever-increasing part in the Air Corps as a whole. Research has been carried on continuously since the creation of that specialized branch of Army medicine on January 19, 1918, at Hazelhurst Field, Mineola, Long Island. In those days it was known as the Medical Research Laboratory and was housed in the usual wartime constructed buildings. Experiments were conducted in a mammoth low-pressure tank, the first facts regarding the now well-understood "oxygen starvation" having been determined.

Medical examining boards had already been created in various sections of the country to examine the horde of applicants for aviation training at the thirty-one flying schools, certain fundamental requirements having been laid down by the Office of the Surgeon General.

As early as May, 1919, a course for Flight Surgeons was offered at the Medical Research Laboratory, and in November of that year, the laboratory itself was moved to Mitchel Field, also on Long Island.

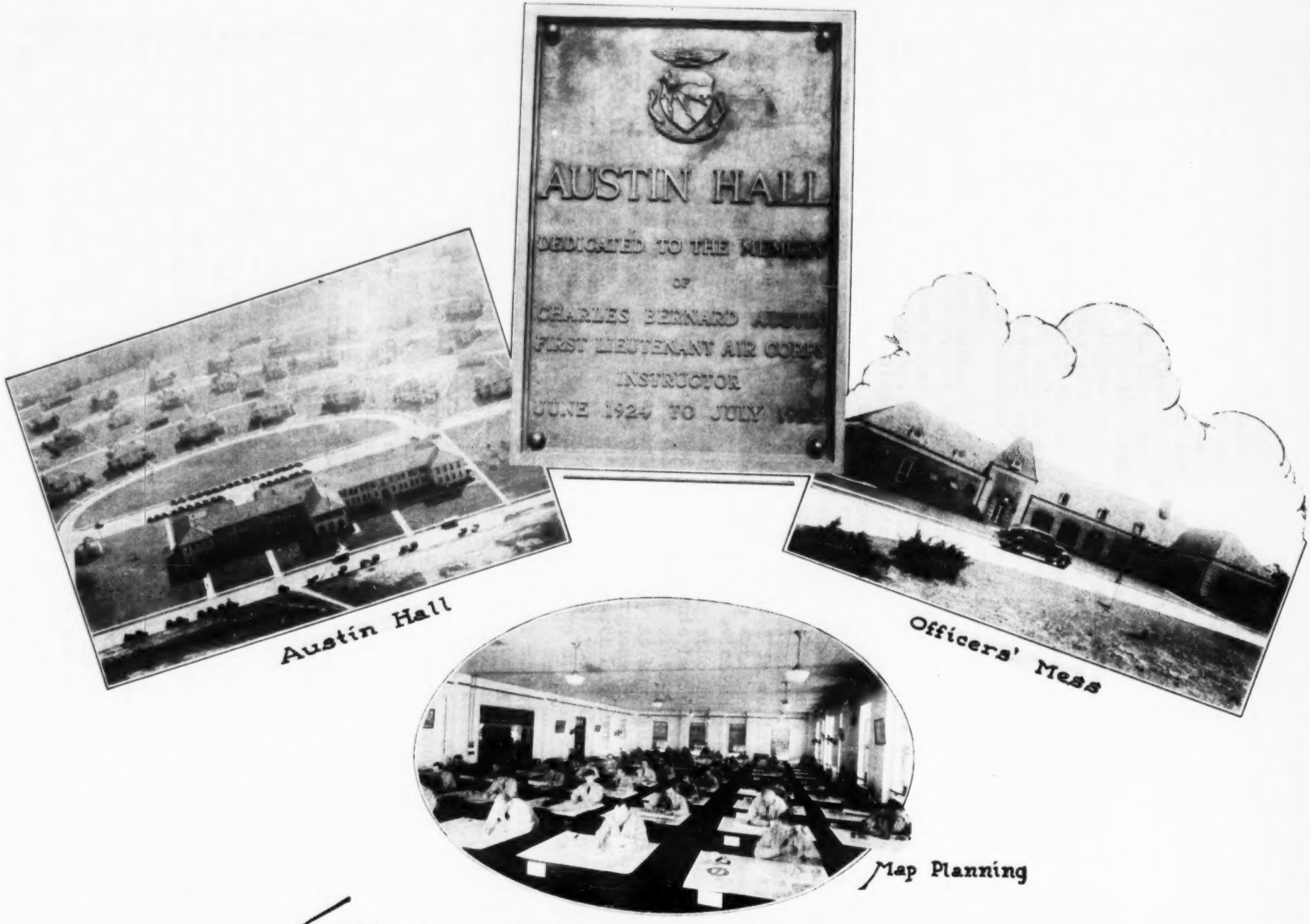
The School of Aviation Medicine formally came into being on November 8, 1922, when the title that it had held to the present day was first created. Research was carried on for a considerable time, and in 1926, announcement was made of the fundamental basic principles from the human viewpoint on which the art of Blind Flying is founded.

In order to be in a position more closely to study human behavior of student pilots while undergoing flight training, the school of Aviation Medicine was transferred to Brooks Field in 1926, and upon the consolidation of the Primary training activities at Randolph Field in in 1931, the School was likewise transferred to Randolph Field, its present home.

The past history of the Air Corps Training Center has been written— is a matter of record. Its achievements and its shortcomings have been impartially noted. The coming months will put it to a test almost as severe as the one it faced during the hectic days of 1917.

Problems of training undreamed of in

(Continued on Page 16)



The Air Corps Tactical School, Maxwell Field. Alabama.

THE AIR CORPS TACTICAL SCHOOL

Working under high pressure to satisfy the current needs of the Air Corps for trained leaders and staff officers, the Air Corps Tactical School has followed the trend of other military aviation activities and resorted to mass production. As this is read, the largest class in the history of this nineteen year old school is working on problems of Air units in tactics, command and staff, strategy, and logistics, as well as coordination with other military arms. "Old grads," however, when they visit the school will be surprised not alone by the filled-to-capacity class rooms of 100 students, but by the character and scope of the instruction condensed into twelve weeks, where nine months had been the standard school year in common with other service schools.

Like the Air Corps, the school has grown from a modest beginning, starting at Langley Field, Va., in 1920, when it was called the Air Service Field Officers' School. Two years later that designation was changed to its present one. In 1931, the school was moved to Maxwell Field, Alabama, where it is now located. The function of the school is to train officers for command and staff duties in all types of Air Corps tactical units, as well as to acquaint officers generally with the vast correlated problems which are involved in the planning, administration, supply and operation of an Air Force prepared for war and engaged in war.

Since the school's inception it has opened new vistas before the officers who have attended its courses; has led them to think of their profession in terms other than those duties whose scope is limited by peacetime garrison requirements. In its early days there was little groping forward. Instruction at the school was limited to experiences in the World War, and Observation Aviation was a major subject, with Pursuit Aviation next in importance. By 1925, however, the advent of newer types of airplanes in the Air Service brought a realization of types of the near future, and this in turn gave substantiation to what heretofore had been looked upon by many military authorities as wishful thinking - the doctrine of air power. No longer was the mission of the military aviation forces the defeat of the hostile aviation in the air and the gaining of information as to the disposition, composition and movement of the enemy's ground forces. Instead, there was taught the idea of destroying the enemy's ability to wage war, by the neutralization of his air force and then the destruction of his vital establishments.

With the addition of the course in Naval Operations during the School year 1934-1935, the school first attained a complete curriculum. The shortening of the course from nine months to twelve weeks, for the next year or so, has cut down the time available for all but a very few subjects, but the scope of instruction and its high standard will be maintained intact. The objective of the twelve-week courses is to give all officers of the Air Corps in the senior age bracket (above 32) an opportunity to attend the school, thereby satisfying their individual desires and ambitions while at the same time increasing their value to the Air Corps, and thus its general efficiency. Upon the completion of the "short course period," the school will return to the original nine months' regular course basis.

The Air Corps Tactical School is not a flying school, although its student body is composed of military flyers, with a leavening of officers from other arms and branches of the service. The technique of pilotage has already been mastered by practically all those Air Corps officers who have attended; for until recently they were for the most part senior officers of the Air Corps, of long and varied experience. Many still are, but after the current short courses have been completed most Air Corps officers above the age of 32 years will have been graduated, and thereafter that age will be the maximum for those detailed to the course of instruction. That means that the student of the future will be a first lieutenant about ready to assume the duties of a Flight Commander or senior staff officer in a squadron or a junior staff officer in a group staff, if he has not already served in such capacity.

The instruction is not devoted entirely to air subjects. A comparatively thorough course is given in ground subjects for the purpose of giving the Air Corps officer a good general idea of the organization and methods of the other branches of the Army. Many graduates later detailed to the Command and General Staff School at Fort Leavenworth, Kansas, will receive there a more thorough course in these subjects. Many officers of the Air Corps do not have the opportunity of attending any service school but this. Their normal duties may bring them but little into contact with the ground arms or with problems related closely to staff or logistical work. A certain percentage of the class comes to school with only the vaguest ideas in these respects. It is the mission of the Departments of Ground Tactics and of Command, Staff and Logistics to remedy this deficiency. Air subjects do predominate, however, and reference to the tabulation on

hours of instruction submitted with this article will indicate to the reader the variety of the subjects offered.

The academic activities are divided into three departments. The most important, or basic one, is the Department of Air Tactics and Strategy. The other two, the Department of Command, Staff and Logistics, and the Department of Ground Tactics have somewhat of a dual mission. Not only do these latter two prepare the student for the instruction given in air tactics and strategy, but they round out his complete education as an Air Corps officer trained to fill a command or staff assignment in almost any capacity, especially where he will have close relations with other branches and arms of all the armed services as well as positions other than those dealing directly with air tactics or strategy.

In general, the method of instruction in most subjects follows a definite pattern. Lectures or conferences are conducted in which the principles of the subject and their applications are described, a study assignment from the text book having been given the students to prepare them for such conference.

After several such conferences, an illustrative problem is worked in class. Should it be the Bombardment Aviation course, for instance, each student finds himself a Bombardment Group Commander, ordered to strike a certain objective with his Group. Through each of the many problems which would actually confront a Group Commander in such a situation, the instructor leads the students. Considering the opposition imposed by enemy anti-aircraft artillery and Pursuit Aviation, the character of the objective and the support by friendly Pursuit, Attack and Reconnaissance Aviation, and all other factors, the "Group Commander" student makes his basic decision for the attack and announces to his "Squadron Commanders" the time and general method of attack; followed by such details as the bombs and fuzes to be used, the type of formation to be flown, the landmarks to be used and the routes flown, the direction and altitude of attack, the method of bombing, and other details necessary for the instruction of his "Squadron Commanders" in the Group. In some subjects, demonstrations of units in action are also held. For the past two years, a one-act playlet depicting a commander and his general staff preparing for battle has been presented to each class. Such conferences, demonstrations, illustrative problems and similar exercises in each subject culminate in one or more examinations, called "map problems," in which each student is given a situation and works out alone and to his best ability what he believes, and hopes, is an excellent solution. Where the subject does not lend itself to a map problem, a quiz or two may be given instead to test the students' knowledge and allow the instructor to determine if he is putting all phases of his subject across to those on the receiving end.

The following is a brief summary of some of the subjects covered in the school:

AIR FORCE

Air Warfare.-- The characteristics of air forces, elements of air strategy, air force offense and defense, air bases, organization and composition of air forces, and the influence of air power upon warfare.

Principles and Tactical Doctrine for Combat Aviation.-- An introduction to the air tactics that are common to all combat aviation, including doctrines for air attack, air combat, and air observation.

Air Forces of the Army.-- The functions of the Army and the Navy, organization, control, missions and principles of employment of the Air Forces of the Army.

Antiaircraft Defense.-- Integrated systems of antiaircraft defense, involving the employment of Pursuit aviation, antiaircraft artillery and the measures for security and passive defense in the defense of the air base and other establishments.

Air Operations.-- Doctrines of employment for combat aviation, plans and orders, and the employment of the Air Force in typical strategical situations.

ATTACK AVIATION

This course covers the function, organization, destructive agencies, materiel, methods of applying destructive and neutralizing agents and formations in detail. The tactics and technique of the Attack Group and lower units, both during day and night operations, are discussed and the principles covered are applied and illustrated.

BOMBARDMENT AVIATION

This course covers the function, organization, training, destructive agencies, materiel, methods of bombing and bombing accuracy, and formations in detail. The tactics and technique of the Bombardment Group and lower units, in daytime and at night, at high altitudes and at low, are discussed and the principles covered are applied and illustrated.

OBSERVATION AVIATION

This course covers the function, organization, equipment, technique and tactical employment of Air Force Observation, and the function, organization, equipment, technique and principles of

employment of ground force observation aviation. The operations of both are applied and illustrated.

PURSUIT AVIATION

This course covers the functions, organization, training, weapons, equipment and tactics and technique of Pursuit tactical units. Gunnery principles as they influence the tactics and technique of Pursuit are covered in some detail, and their practical application is illustrated. The coordination of Pursuit operations and tactics with the various ground agencies, as well as the organization, composition and use of an aircraft reporting net for Pursuit operations are fully covered and illustrated.

MILITARY INTELLIGENCE

The scope of this course, in brief, follows:

Military Intelligence.-- The course is designed to acquaint the class with the process by means of which information of the enemy is developed into military intelligence, the organization by means of which this is accomplished, and the principles governing the employment of military intelligence agencies, both air and ground.

Military Geography.-- This subject includes physical geography, human geography, political geography, and economic geography. It consists of much more than a mere collection of data - it is an analysis of the latest accurate data made from a military viewpoint. The course is presented in lecture form based on selected areas.

COMBAT ORDERS

This course is designed to acquaint the class with the several kinds of combat orders, stressing particularly field orders. The instruction covers the orders of both air and ground units, with special attention to expression, technique, form and sequence.

LOGISTICS

Logistics is that branch of the art of war which determines the details necessary for the movement and supply of troops throughout all phases of military operations. The subject is presented in two courses, Air Logistics and Ground Logistics.

Air Logistics.-- This course covers the organization of logistical agencies serving the air units, and the principles and methods governing the operation of these agencies.

Ground Logistics.-- This course presents a general picture of the territorial organization of a theater of war, and includes a detailed study of the supply and movement of the infantry division.

STAFF DUTIES

This course is concerned with command and staff principles, functions, and organization, with particular reference to staff teamwork and the preparation of the common staff papers, including journals, reports, staff maps, and objective folders. The course covers the staffs of both the air and ground units and culminates in a map maneuver, in which the commanders and staff of a Bombardment Group and one of its squadrons are confronted by the many problems and perform the many duties incident to the preparation for a bombardment mission, the mission itself and the preparation for the next mission, except for the actual flying connected therewith.

SIGNAL COMMUNICATIONS

While communications are most essential to the operation of all combat units, they are auxiliary and not peculiar to any specific ground section in this department. In this course the adaptation of each class of communications to the operations of the combat units is developed and methods of solving communications problems met with in practical operations are suggested. The course covers the communications of both the ground and air units, and this course ends with a realistic demonstration of an air wing's message center in operation.

Maxwell Field also is the home of the Air Corps Board. Formerly this activity was maintained by the school, but it now enjoys a more independent status, although the Tactical School Commandant and Assistant Commandant are both ex-officio members. The Board is charged with the study of such subjects as may be referred to it by the Chief of the Air Corps and such as it may itself originate looking toward the improvement of the Air Corps. In general, it makes recommendations on matters which involve considerable study and research rather than on matters involving only immediate decision as to policy. The Board and the School work closely together.

The flying performed by the students is that necessary to maintain their general pilot proficiency. Formerly the students actually flew many of the types of missions and sometimes the actual missions which had been presented to them in class. Several years ago, however, such flying was discontinued, as the students as a group did not represent the personnel which would be found in any one particular air unit in time of war, but were rather comparable to a number of Squadron and Group Commanders, without the leavening of junior flight personnel such as would actually be present in a wartime tactical unit. At present there does exist a need at the School for demonstration units which would be truly representative of the probable wartime sit-

uation. Plans are under way to organize and station such demonstration units at the School.

The Air Corps Tactical School might well be described as a proving ground or clearing house for tactical and strategical ideas. Its instructors are all officers of such experience, judgment and military education that they are able to sift out the workable ideas so often generated in tactical Air Corps units, combine such ideas and crystallize them into formal shape for universal dissemination to the service, through the medium of instruction of the School's student body which comes before it each year. They are also officers of practical vision, and have initiated many measures of improvement which, after tentative adoption by the Air Corps, have proven entirely practicable after service testing in maneuvers or exercises of a like character.

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STAFF AND FACULTY
AIR CORPS TACTICAL SCHOOL

COMMANDANT
COLONEL WALTER R. WEAVER, A. C.

ASSISTANT COMMANDANT
COLONEL MILLARD F. HARMON, A.C.

SECRETARY
MAJOR HARLAN W. HOLDEN, A. C.

DEPARTMENT OF AIR TACTICS AND STRATEGY
Director: Lt.Col. D.Wilson,A.C.

AIR FORCE SECTION
Chief:
Major M.S.Fairchild, A.C.
Instructors:
Major F.M. Hopkins, A.C.
Major C.E. Thomas, A.C.
Captain L.S. Kuter, A.C.

ATTACK SECTION
Chief:
Major R.F. Stearley, A.C.
Instructor:
Captain E.W. Barnes, A.C.

BOMBARDMENT SECTION
Chief:
Captain R.A. Snavely
Instructor
Captain L.S. Kuter, A.C.

OBSERVATION SECTION
Chief:
Major B.E. Gates, A.C.
Instructor:
Major A.F. Shea, A.C.

PURSUIT SECTION
Chief:
Major J.E. Parker, A.C.
Instructor:
Captain E.E. Partridge,A.C.

NAVAL OPERATIONS SECTION
Chief:
Lt. Comdr. W.H.Buracker,USN
Instructor:
Major F. von H. Kimble, A.C.

DEPARTMENT OF COMMAND, STAFF AND LOGISTICS
Director:
Lt.Col. L.A. Walton, Air Corps

COMBAT ORDERS SECTION
Chief:
Major F. von H. Kimble, A.C.
Instructor:
Captain R.C. Oliver, A.C.

COMMUNICATIONS SECTION
Chief:
Major R. Birnn, A.C.

LOGISTICS SECTION
Chief:
Major J.Y. York, A.C.
Instructor:
Major L.E. Sharon, A.C.

MILITARY INTELLIGENCE SECTION
Chief:
Major R.C. Oliver, A.C.

STAFF DUTIES SECTION
Chief:
Major R. Birnn, A.C.
Instructor:
Major H.W. Holden, A.C.

EXTENSION COURSE
Chief:
Major B.T. Burt, A.C.
Assistant:
Captain R.C. Oliver, A.C.

DEPARTMENT OF GROUND TACTICS
Director:
Lt. Colonel C.P. Hall,Infantry

ANTIAIRCRAFT SECTION
Chief:
Major F.G. Epling, C.A.C.
Assistant:
Major H.H. Ristine, F.A.

CAVALRY SECTION
Chief:
Lt. Col. Mullenix, Cav.
Instructor:
Major A.J. Barnett, Inf.

CHEMICAL WARFARE SECTION
Chief:
Major A.H. Waitt, C.W.S.
Assistant:
Lt. Col. J.C. Mullenix, Cav.

GROUND TACTICS SECTION
Chief:
Lt. Col. C.P. Hall, Inf.
Instructors:
Major H.H. Ristine, F.A.
Major A.J. Barnett, Inf.
Major F.G. Epling, C.A.C.
Major A.H. Waitt, C.W.S.

FIELD ARTILLERY SECTION
Chief:
Major H.H. Ristine, F.A.
Assistant:
Major F.G. Epling, C.A.C.

INFANTRY SECTION
Chief: Maj. A.J.Barnett, Inf.
Asst.: Lt.Col. C.P. Hall,Inf.

MAP READING SECTION
Chief: Maj. F.G. Epling,C.A.C.
Asst.: Capt.R.C.Oliver, A.C.

HOURS OF INSTRUCTION
at the Air Corps Tactical School

	12 Weeks Course Hours	9 Mos. Course Hours
DEPARTMENT OF AIR TACTICS AND STRATEGY	(142)	(280)
Air Force	44	(110
Antiaircraft Defense	10	(
Attack Aviation	20	42
Bombardment Aviation	20	41
Naval Operations	12	25
Observation Aviation	20	33
Pursuit Aviation	16	29
DEPARTMENT OF COMMAND, STAFF AND LOGISTICS	(89)	(172)
Combat Orders	19	28
Signal Communications	6	12
Efficiency Reports	1	2
Logistics	18	51
Meteorology	--	12
Military Intelligence	17	24
Staff Duties	28	43
DEPARTMENT OF GROUND TACTICS	(63)	(221)
Antiaircraft Artillery	12	27
Cavalry	1	15
Chemical Warfare	8	19
Ground Tactics	27	--
Combat Principles	--	26
Combined Arms	--	34
Field Artillery	1	18
Infantry	2	27
Map Reading	6	--
Maps and Photographs	--	18
Solution of Problems	6	6
World War	--	21
Domestic Disturbances	--	8
Medical Corps	--	2
MISCELLANEOUS, Orientation, etc.		7

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TACTICAL SCHOOL SITE USED BY WRIGHT BROTHERS

In February, 1910, Mr. Wilbur Wright arrived in Montgomery, Alabama, with the object in view of locating a site for the establishment of a flying field and training center for aviation in the South.

A committee of the Commercial Club of Montgomery, predecessor of the present Chamber of Commerce, met with Mr, Wright, and a number of fields in the vicinity of Montgomery were inspected. The one selected by Mr. Wright, and subsequently used by him and his instructors in teaching the art of flying, is the site of the present Maxwell Field. Certainly, insofar as inspiration and tradition is concerned, there could be no fitter spot in this country for the location of a school, the mission of which is the education of officers in the technique, tactics, and strategy of Air Forces.

COMMANDANTS AND ASSISTANT COMMANDANTS
of the Air Corps Tactical School

School Years 1920-21

Commandant: Major Willian N. Hensley
Asst. Commandant: Major Thomas DeW. Milling

1921 - 1924

Commandant: Lieut. Col. Chas.H. Danforth
Asst. Commandant: Major Thomas DeW. Milling

1924 - 1925

Commandant: Major Oscar Westover
Asst. Commandant: Major Thomas DeW. Milling

1925 - 1926

Commandant: Major Oscar Westover
Asst. Commandant: Major Earl L. Naiden

1926 - 1929

Commandant: Lt. Col. Clarence C. Culver
Asst. Commandant: Major Walter H. Frank

1929 - 1930

Commandant: Lt. Col. Jacob W.S. Wuest
Asst. Commandant: Major Walter H. Frank

1930 - 1931

Commandant: Lt. Col. Roy C. Kirtland
Asst. Commandant: Major John F. Curry

1931 - 1934

Commandant: Major John F. Curry
Asst. Commandant: Major Fume Peabody

1934 - 1937

Commandant: Colonel Arthur G. Fisher
Asst. Commandant: Colonel Herbert A. Dargue

1937 - 1938

Commandant: Brig. Gen. Henry C. Pratt
Asst. Commandant: Colonel Herbert A. Dargue

1938 - 1939

Commandant: Colonel M. F. Harmon
Asst. Commandant: Lt. Col. Donald Wilson

1939 - 1940

Commandant: Colonel Walter R. Weaver
Asst. Commandant: Colonel Millard F. Harmon

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GRADUATES - AIR CORPS TACTICAL SCHOOL

Year	Air Corps	Other Branches
1921	11	0
1922	11	1
1923	17	0
1924	13	1
1925	14	0
1926	12	4
1927	9	11
1928	13	10
1929	14	14
1930	16	14
1931	24	15
1932	28	11
1933	32	10
1934	38	5
1935	49	10
1936	59	10
1937	58	13
1938	60	12
1939	60	16

THE AIR CORPS TECHNICAL SCHOOLS

During the early phases of the World War, it became apparent that a great number of skilled mechanics would be required to maintain the large number of airplanes projected for training and combat purposes. The Aviation Section of the Signal Corps attempted to meet this situation by instruction of the newly enrolled soldiers in State universities and technical schools, but quickly learned that the plan was not feasible - due mainly to lack of competent instructors, equipment and the exorbitant expense.

To bridge the gap between civilian life and aviation technician, further experiments were made, and two technical schools were established; one at St.Paul, Minn., and the other at Kelly Field, Texas. These schools were operating at capacity when the war ended in November, 1918. Shortly after the Armistice, the St. Paul school was closed and the Kelly Field institution was retained and incorporated into the educational system of the Air Service.

The early days of the school at Kelly Field recall a wealth of memories. Too little is known by the present generation of its struggles for existence.

The school was established as the Enlisted Mechanics' Training Department and set up in the southeast corner of Kelly Field #1, now Duncan Field. The site was wild, woolly, desolate and contained more than its share of cactus, prickly pear and mesquite. The original installations included two large tent hangars, each containing one Glenn Martin airplane, two Thomas-Morse 8 cyl. liquid-cooled airplane engines, and three instructors (one airplane and two engine mechanics). The instruction consisted solely of lectures, and classes were instructed from 8:00 A.M. to 10:00 A.M.

The organization was complete, and no apparent reason existed why the mechanics should not be turned out in droves. The school was functioning perfectly, and had been for two days, when a catastrophe struck in the form of a "Norther" which distributed the school neatly, but not gaudily, over the southern counties of the Lone Star State. The airplanes and engines were saved because of the large number of students available to act as anchors.

The school authorities were not daunted, however, and reestablished their organization on a firmer basis. Two steel hangars were acquired, and two months later the staff and faculty, having completed the salvage operations necessary to place their instructional equipment on display, invited the former students to resume their quest for knowledge.

One week passed and all was serene. Then, for no recorded reason, the students failed to report, and the school did not function for a period of five weeks. During this enforced idleness, the Commanding Officer of the school became restless over the inactivity of his institution, and he wrote numerous letters. One such letter sifted through the eight assorted adjutants and their assistants of the Headquarters, Kelly Field, and eventually found its way to the desk of the Commanding General of the Southern Department.

The Commanding General was a man of action, and he issued an order to the effect that each squadron at Kelly Field (there being in excess of one hundred) would dispatch students to the school - and get them there in a hurry. All squadron commanders, upon receipt of the order, obeyed with commendable zeal, and the opening morning of the sixth week found an army of three thousand potential students, eager for knowledge in the field of aeronautics, marching across the flying field and bearing down upon the two insignificant hangars in the far reaches of the reservation.

The School Commander viewed the oncoming horde with alarm. His hangars would accommodate three hundred and twenty men, and the Commanding General had unwittingly unleashed ten-fold upon him. He made an immediate decision to close the school until such time as the now plentiful supply of students could be handled in classes. It was a sagacious move on his part, but unfortunately was made too late in the day. The three thousand, not having been advised of the closing edict, rolled in like a Mississippi flood. They went over, through and beyond the hangars and left them, as the old saying goes, "As clean as a whistle." The fourteen instructors were the first casualties and were lost early in the game. The three thousand, having become convinced that aeronautical knowledge would not be forthcoming, turned their attention to the collection of aeronautical souvenirs. The order of departure is not recorded, but it is believed that the altimeters went first, followed promptly by spark plugs, struts, fabric, wires, turnbuckles and anything else readily transportable. By noon the hunt was over and the students were herded back to their organizations;- of the airplanes and engines, there remained not a trace.

V-8110, A.C.

The faculty were of sturdy stock and the reconstruction of the school followed in May of 1918. Conditions improved immeasurably, due mainly to the acquisition of better equipment and a supply of text and reference books. The school was now established on a firm basis, and past experiences served the staff well. The first students were taken in, given the course and returned to their organizations. Great surprise was expressed that the graduates had absorbed some knowledge of airplanes and engines and that they were generally useful in the various squadrons. Having taken the surprise in stride, the expansion of the Enlisted Training Department got under way in earnest. Numerous courses were added, the faculty and facilities increased, and a short time later the name was changed to the "Air Service Mechanics' School." It was with this change in designation that the school became a permanent organization of the Air Service.

During January of 1921, the school was moved from Kelly Field, Texas, to its present site at Chanute Field, Rantoul, Illinois. Some idea of its growth from the tent hangar stages to the time of transfer, may be gained from the fact that it required ninety freight cars, a train of nearly two miles in length, to transport the material in the change of station.

At Chanute Field, the school was set up in what had been a wartime constructed flying field. The buildings were poor, but far in advance of any accommodations the school had previously enjoyed. The buildings were not ideally suited for a Mechanics' School, but the equipment was unloaded and installed in prearranged hangars or buildings, and once again the school began to function.

Shortly after the Armistice, a Photographic School had been organized at Langley Field, Va., and a Communications School established at Post Field, Ft. Sill, Okla. In 1922, a decision was reached to transfer these two schools to Chanute Field and incorporate them with the Mechanics' School into one organization. This transfer was effected, and the designation of the newly created unit was the "Air Corps Technical School" Subsequently, Armament was detached from the Department of Mechanics and established as a separate department during 1930. To these were also added the Department of Basic Instruction and Department of Clerical Instruction.

During the life of the Air Corps Technical School, many changes have taken place. Courses that were once stressed are of so little value in present day aviation that they have since been discarded. The school has kept abreast of aviation and has adapted itself to the change from wood and fabric to metal construction. New courses have been added as the need for same became apparent. During 1937, four specialist courses were added: namely, Carburetion Electrical, Propellers and Instruments. These courses are available to especially selected enlisted men and are in the nature of post graduate work.

Shortly after the school at Chanute Field was established, it became apparent that the present installations would be overrun, and efforts were made to secure funds for permanent construction on a suitable site. The Rantoul location was considered unsatisfactory, since it lacked facilities for a machine gun and bombing range. Then, too, there were far too few cloudless days available for the taking of aerial photographs. The War Department, in 1935, appointed a Board of Officers, headed by Colonel B.K. Yount, now Brigadier General, to initiate a survey of the United States and make recommendations for a suitable site as a secondary branch of the Technical School. After having surveyed sixty odd locations, the Board recommended Denver as the most suitable.

On February 12, 1938, the Denver Branch was occupied by troops from Chanute Field, and two weeks later instruction was started in the departments of Armament and Photography. In October, 1938, an additional department of instruction was added to the Denver Branch, with the transfer of the Air Corps Supply and Technical Clerks' Department from Chanute Field.

The field at Denver was named in memory of Lt. Francis B. Lowry, Coast Artillery, who was killed in action during the World War while acting as observer under detail with the 91st Aero Squadron.

Lowry Field proper comprises 960 acres and is located on the outskirts of Denver, approximately six miles east southeast of the center of the city. Part of the site was originally occupied by the Phipps Memorial Sanitarium. This was given to the city by Senator Lawrence E. Phipps for the express purpose of being ceded to the Government for use as an air school. In addition to this 960 acres, known as Lowry Field, the city of Denver ceded to the War Department a tract of land consisting of approximately 100 square miles, dimensions, eight by twelve miles, for use as a gunnery and bombing range. The area includes runways, now being

laid out; three 150,000 pound magazines; a control tower and other essentials necessary to the conduct of aerial operations involving gunnery and bombing. This area is approximately eight miles east of Lowry Field.

The Air Corps Technical School has instructed classes of officers and enlisted men and it is estimated that more than 10,000 students, in all categories, have passed through it. Many foreign officers and officers of the U.S. Navy, Marine Corps, Coast Guard and National Guard have graduated and carried their knowledge to their respective services. It may be interesting to note the foreign officers who have attended the Technical School. The following countries have been represented, as well as the sister services previously noted: Ecuador, Chili, Cuba, Peru (Navy), Royal Canadian Air Force, The Netherlands Air Force, Siam, Norway, Guatemala, Colombia, Mexico and the Philippine Army.

It is difficult to estimate the contribution of the Air Corps Technical Schools to the advancement of aviation, not only military - but also commercial. The aircraft industry has leaned heavily upon the School for personnel in their expanding ventures. The School doctrines have been carried far and wide by officers and enlisted men of other services, the National Guard and foreign governments. Graduates have stepped into responsible positions as civilians, with the Materiel Division and the Department of Commerce. Communication and weather service personnel have been extensively employed by commercial air lines, and this same fact holds true for graduates of all departments of the school.

Funds were made available July 1,1938, and the reconstruction of Chanute Field began in earnest. Construction contracts have been let for a majority of the projects authorized and the future of the school bids fair to outstrip the glory of the past. The training of technicians must be kept apace of recruitment and possibly the outstanding single objective in the Air Corps expansion program will be an output of graduates competent to man the new materiel and staff the new organizations.

The school has been hit by "Northers" overrun by potential students, burned in spots by fire, but has been fortunate enough in the past to rise above these difficulties. It has passed through periods when students were not available and periods when the school was considered of doubtful value. It has weathered each shock and survived each criticism. Its mission in the Air Corps is well known by our present service personnel, and none would be so foolish as to suggest curtailment of such a splendid institution. Its star is in the ascendency and to it has fallen the important task of training the recruits of the greatly expanded Air Corps. The Air Corps Technical Schools will prove equal to the occasion, will reflect the experience gained in the past and will prove worthy of its motto, "Sustenio Alas"(I sustain the wings).

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The Air Corps Training Center

(Continued from Page 8)

those days must be met. The airplane has become a complex machine requiring an exacting, never-relaxing skill. Not only will the Training Center, but the Air Corps as a unit, be confronted with the task.

Another page in the history of the Air Corps is being written.

Ed. Note:
The major portion of this article was written by 1st Lieut. William Preston Nuckols, Air Reserve.

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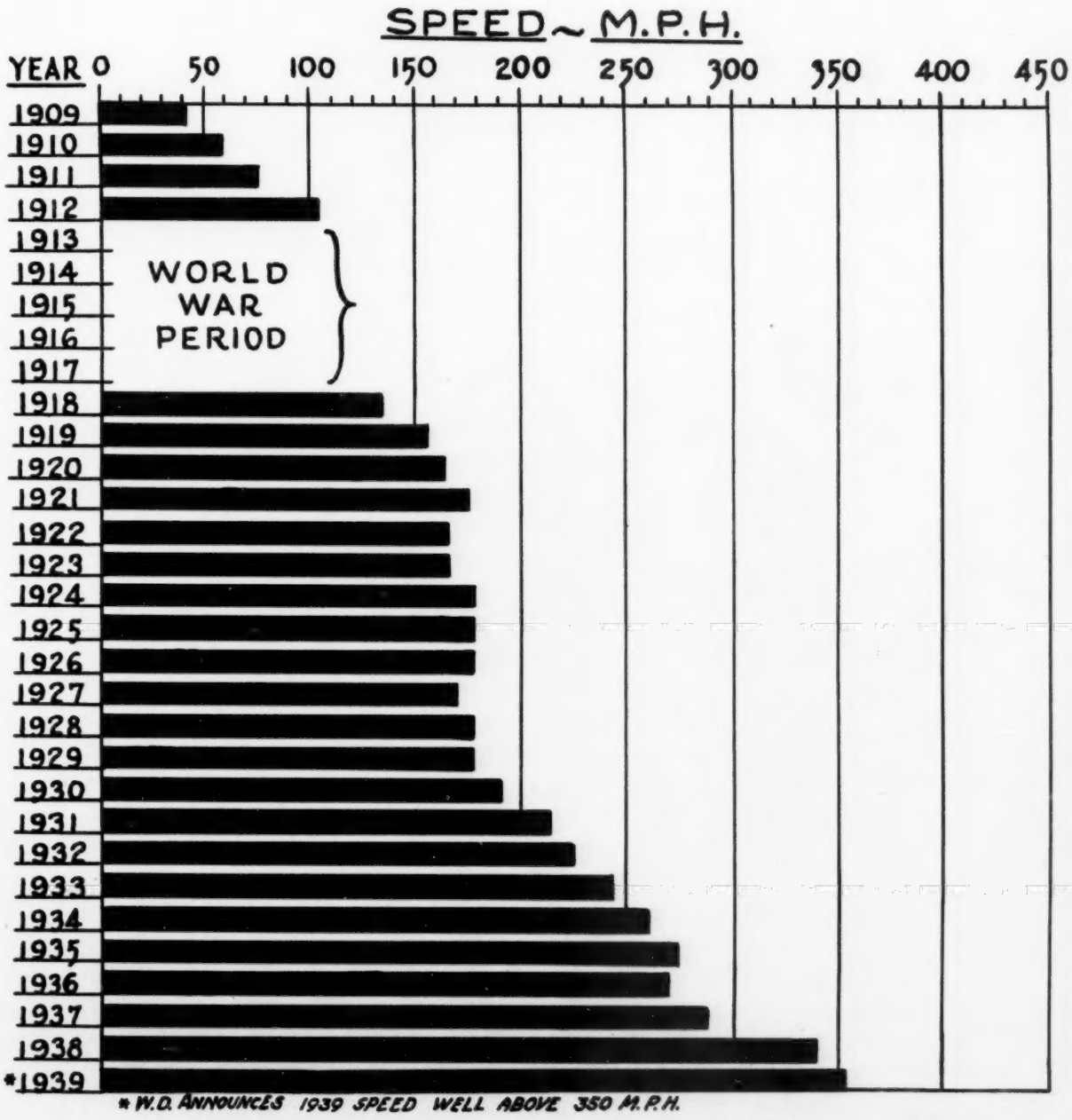
THE DEVELOPMENT OF AIRCRAFT SPEED

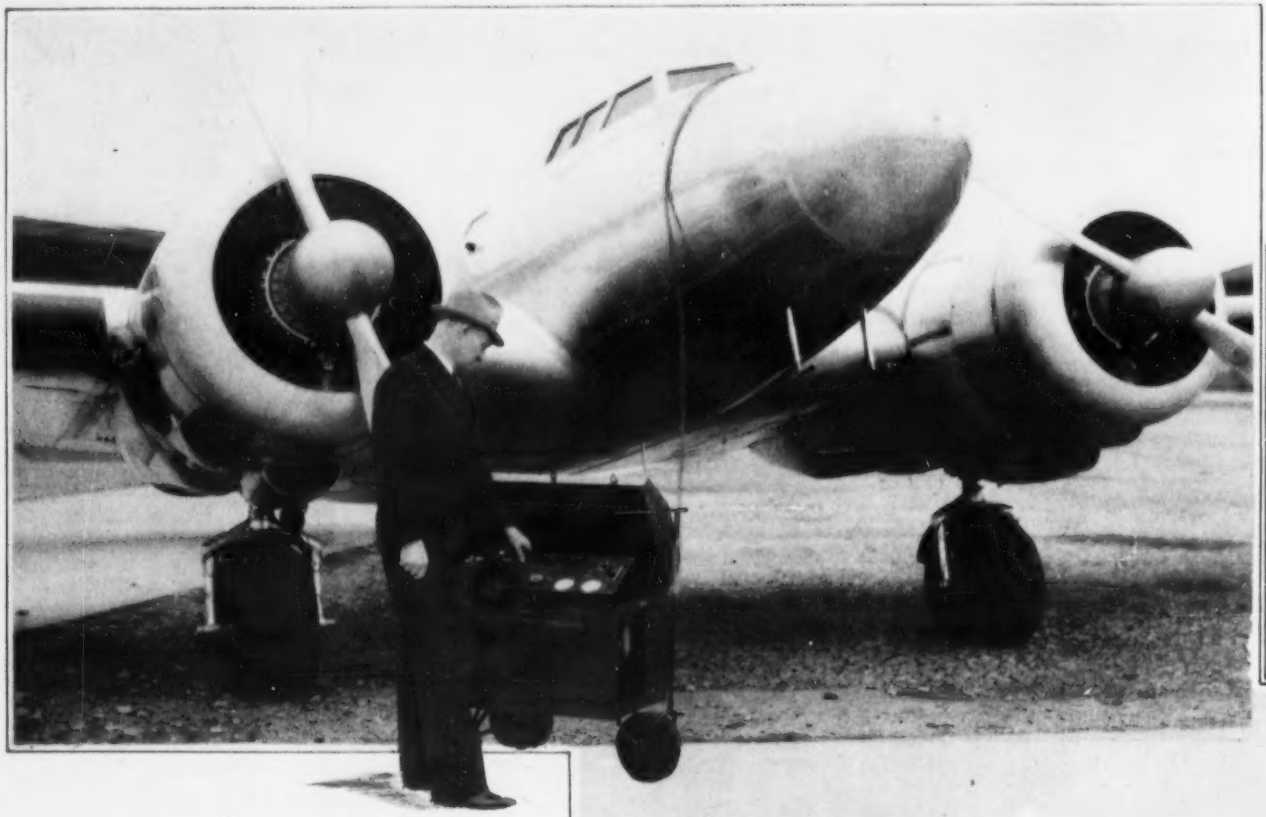
1909 - 42 mph		Wright Brothers plane
1910 - 61	"	Bleriot Monoplane
1911 - 78	"	Nieuport (100 h.p.)
1912 -105	"	Deperdussin Racer
World War Period - No official data		
1918 - 136 mph		- LePere (C-11)
1919 - 154	"	- Verville (VCP-1)
1920 - 165	"	- Orenco (D-1)
1921 - 177	"	- Curtiss Racer
1922 - 168	"	- Air Service Engineering Division (VCP-1)
1923 - 168	"	- Air Service Engineering Division (VCP-1)
1924 - 178	"	- Curtiss (PW-8A)
1925 - 178	"	- Curtiss (PW-8A)
1926 - 178	"	- Curtiss (PW-8A)
1927 - 172	"	- Curtiss (P-5)
1928 - 177	"	- Curtiss (XP-6 Hawk)
1929 - 177	"	- Curtiss(P-6 Hawk)
1930 - 192	"	- Boeing (P-12)
1931 - 215	"	- Curtiss (Y1P-24)
1932 - 234	"	- Boeing (P-26A)
1933 - 244	"	- Boeing (P-29)
1934 - 256	"	- Consolidated P-30 (PB-2A)
1935 - 274	"	- Consolidated (PB-2A)
1936 - 269	"	- Seversky 1-XP (XP-35)

It is interesting to note from the above the very gradual increase in the speed of Army service aircraft since the World War and up to the year 1929 and the rapid rate of increase in speed from the year 1930 and onward.

Since 1936 the increase in speed has been most marked.



AIRCRAFT SPEED OVER 30 YEAR PERIOD



FIELD UNIT FOR TESTING AIRPLANE INSTRUMENTS, WHICH RENDERS IT UNNECESSARY TO REMOVE INSTRUMENTS FROM THE AIRPLANE TO FIND OUT WHAT IS WRONG WHEN AN INCOMING PILOT COMPLAINS OF MALFUNCTIONING.

THIS EQUIPMENT HAS RECENTLY COMPLETED SERVICE TESTING.

TWO OPPOSITELY ROTATING PROPELLERS IN CLOSE TANDEM MOUNTED ON CURTISS PURSUIT AIRPLANE AT WRIGHT FIELD. PERMITS REDUCTION OF PROPELLER DIAMETER FOR EQUAL POWERS, NEGATION OF ENGINE TORQUE, AND INCREASES SPEEDS.

HISTORY OF THE AIR CORPS MATERIEL DIVISION

Upon the entry of the United States into the World War in 1917, the only engineering department concerned with aeronautical development for the Army was composed of a handful of engineers and draftsmen working in the Aviation Section of the Signal Corps in Washington, D.C. In October, 1917, it was decided to establish under the Equipment Division, Signal Corps, a laboratory for aeronautical experiment, testing, and research in order to provide adequate aviation equipment for war purposes.

Dayton, Ohio, was selected as the locale for this laboratory because of its centralized position with respect to the aeronautical manufacturing agencies and, further, because a field which was already graded for aviation purposes was available there. According to the plan, this was to be no military post but an organization for strictly engineering purposes.

The work of constructing buildings was started immediately. On November 5, 1917, Lieut. Colonel V.E. Clark, Signal Corps, U.S. Army, was placed in command of the establishment, the name of which was the Airplane Engineering Department, Equipment Division, of the Signal Corps.

The name of the field at which the laboratories were to be located was McCook Field, for General Anson McCook, who with his seven sons had fought in the Civil War and were known as the "Fighting McCook's." The site chosen for the Signal Corps laboratories had been the McCook farm.

With the arrival on November 14,1917, of the 246th Aero Squadron, consisting of 90 men, the place took on a military air. The Squadron was stationed at McCook Field for guard duty and fire patrol. On December 4, 1917, the buildings had reached a stage of sufficient completion as to permit the reporting thereat for duty of the technical personnel of the Airplane Engineering Department who had been housed temporarily in a Dayton office building.

During the next year, the hurried creation of aircraft organizations for the accomplishment of the enormous aircraft war production program became a terrifically complicated undertaking. Various technical, engineering, and production departments were set up. Quite often these departments, in order to avoid duplication of work, were shifted from one division or bureau to another. Office buildings in Dayton were utilized to fill the need for additional office space, since a sufficient amount thereof was not available at McCook Field.

Upon the signing of the Armistice in 1918, these agencies were gradually consolidated at McCook Field under the name of "Engineering Division, Air Service, U.S. Army." Colonel Thurman H. Bane was the first chief of the new Division an the Commanding Officer of McCook Field.

McCook Field as of January 1, 1919, consisted of a flying field with an area of 254 acres; 69 buildings, including hangars, shops, laboratories, offices, a hospital, wind tunnel, etc. These buildings were erected on ground leased to the Government for $34,000 a year. The personnel consisted of 56 officers, 322 enlisted men, and 1096 civilians.

In 1926, upon the recommendation of the Morrow Board, the Air Service, by Executive Order, became the Air Corps. Under this change, the functions of the Engineering Division were broadened to include not only engineering but also supply, procurement, and maintenance of aircraft. The name of the organization was accordingly changed to "Materiel Division," as a more inclusive and suitable title. A Brigadier General, who officiated also as Assistant Chief of the Air Corps, was placed in charge.

The importance of the experimental engineering work accomplished at McCook Field in its existence of 8½ years had placed it in the ranks of the world's foremost aeronautical laboratories. In the expansion of duties imposed by the addition of the supply, procurement, and maintenance functions, the war-time McCook Field, more than ever before, was overcrowded and cramped for space. Moreover, the war-time laboratory buildings of wooden construction were fire hazards and expensive in upkeep. The flying field was too small for aircraft testing purposes and, being within the limits of the city of Dayton, constituted a hazard to life and property. Many pilots of that day, flying in and out of McCook Field, will remember the huge sign placed upon a hangar facing the field, containing the warning directive: "This field is small. Use it all." New quarters were an essential consideration.

In order to retain the Air Corps laboratories in Dayton (the home of the Wright Brothers), and still a desirable location because of its centralized position with respect to manufacturing agencies, the citizens of Dayton raised $425,000 with which to buy approximately 4500 acres of land lying about five and one-half miles from that city. This tract was offered as a gift to the Government for the purpose of establishing a permanent home for the Materiel Division. Upon acceptance of the gift by the Government, construction of a new field was immediately begun. This action was taken in 1926.

The removal of equipment and personnel from McCook to Wright Field was accomplished in 1927. The dedication of the new field took place on October

12th of that year. The new field, which was to become the seat of the Materiel Division, was named for the Wright Brothers and known as "Wright Field."

One section of the field, comprising 746.78 acres, was allocated to the use of the Materiel Division laboratories and a suitable flying field. The flying field covered 520 acres of this section. The remainder of the reservation, consisting of approximately 3800 acres, was allocated to the use of the Fairfield Air Depot, the large flying field attached thereto being designated "Patterson Field." This arrangement exists today.

The purpose of the Materiel Division, as outlined by an Air Corps Chief, is to have in readiness for immediate production and service the most advanced types of aircraft, engines, armament, and other equipment for the defense of the nation; to procure this equipment in necessary amounts; to issue it to the tactical services of the Air Corps; and to maintain it throughout its service life. The laboratories constructed for the carrying out of this purpose represent an investment of $10,000,000 and the most expert engineering judgment obtainable.

The Materiel Division operates under the direction of Brigadier General George H. Brett, who also serves as Assistant Chief of the Air Corps. In addition to the immediate organization at Wright Field, the Chief of the Materiel Division has supervision over four Air Depots, located at Fairfield, Ohio; San Antonio, Texas; Middletown, Penna.; and Sacramento, Calif.; three Procurement Districts, located at Inglewood, Calif.; Wright Field, and New York City; and six Industrial Planning Districts, located at New York City, Buffalo, Cleveland, Detroit, Chicago and Los Angeles.

During the World War, many of the foremost engineers in the country had gathered at McCook Field to aid in building an air army. Many of these remained on in their various engineering capacities. Commissioned personnel are included among these groups of experts. Together they form a technical vanguard, the influence of which has been felt in all major aeronautical developments, and which has kept the position of the U.S. Air Corps secure through the years. The services of expert test pilots have added materially to the effectiveness of this group.

During the twenty odd years of its existence, the Materiel Division has figured directly or indirectly in virtually all aircraft developments, commercial as well as military. In many instances its contributions have been of major importance, definitely influencing aircraft operation or performance. But a few of these can be included in this brief history.

In the improvement of the airplane power plant, the Division has been particularly fortunate. The present high-powered air-cooled engine is the direct result of the intensive study and experimentation, begun in the McCook Field laboratories in 1919, in the cooling of valves and cylinders. The methods evolved there resulted directly in the production of the famous Wright J-5 "Whirlwind." The higher powered air-cooled engines of today gradually followed.

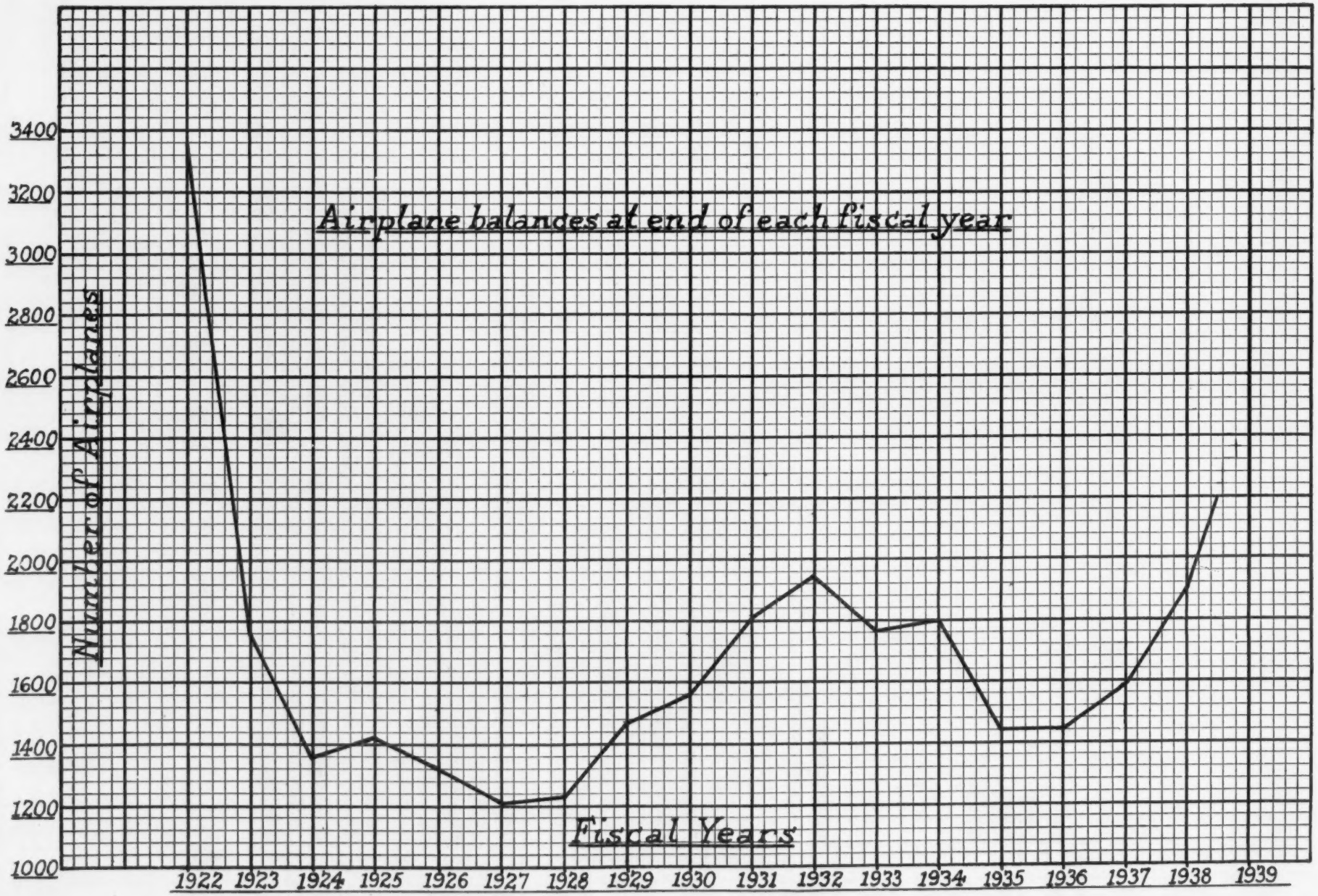
As the result of an investigation of heat losses in water-cooled cylinders, ethylene-glycol was tried in 1923 at McCook Field as a possible high-temperature cooling element. The result of this investigation was the gradual obsoleting of water-cooled engines, a 65 percent reduction in radiator size, and a decided saving in weight.

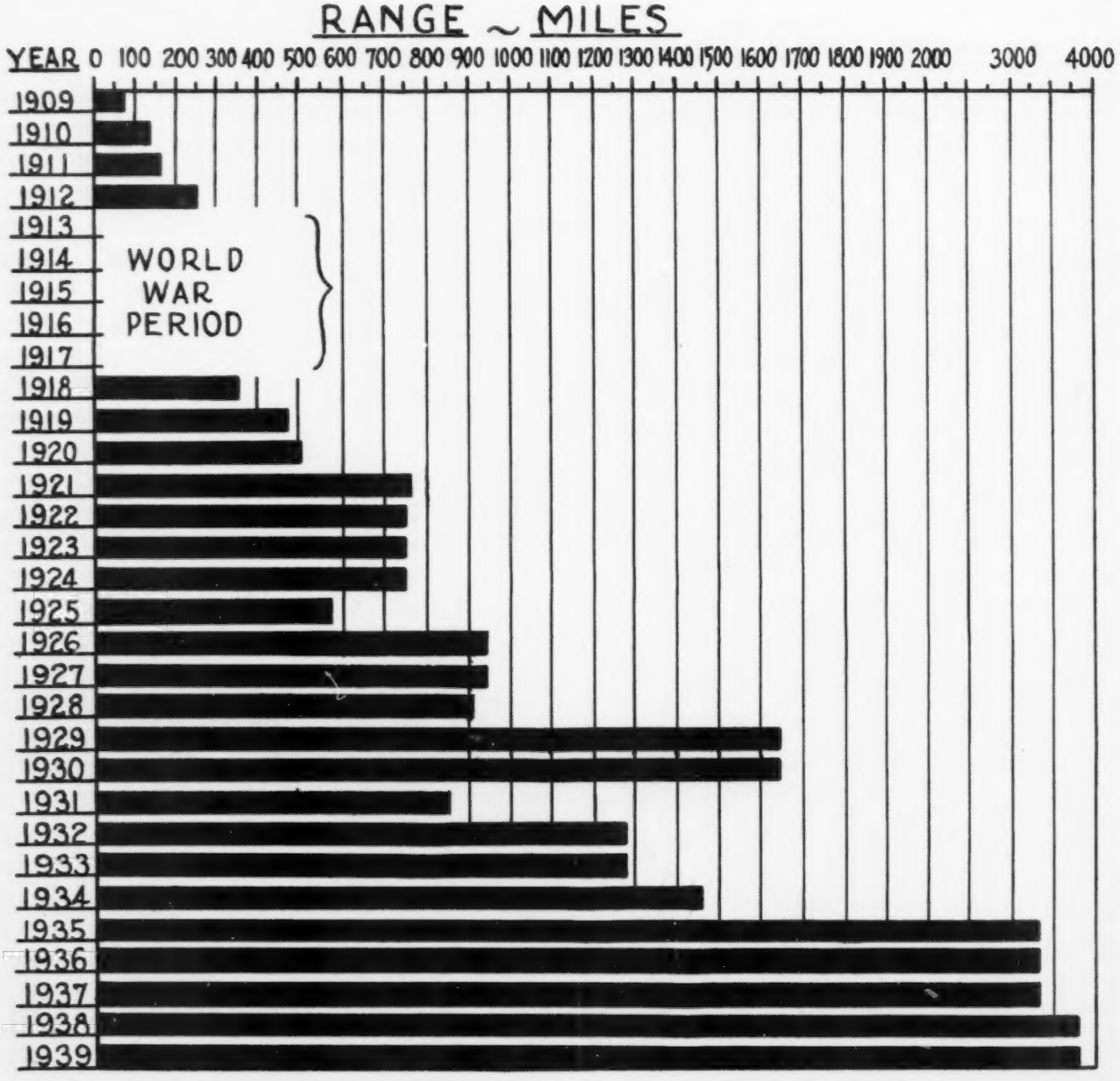
The development of superchargers was a pioneering venture on the part of Division engineers, which, although fraught with technical difficulties, has become a prime factor in the high performance derived from present power plants. In the past several years, the supercharger has been applied to cockpits for the comfort of personnel, as well as to engines. The Lockheed C-35 built for the Air Corps incorporates a supercharged pressure cabin, which not only proved highly successful in its test flights but has caused the supercharger feature to be adapted to other types of aircraft for altitude flying.

Prior to 1928, aircraft engines operated with about 50 octane number fuel. The Air Corps believed that with fuel of higher octane ratings improved engine performance could be obtained. Experiments were undertaken with the cooperation of the fuel industry. Increased power output was made possible with 100 octane fuel, with increase of airplane speeds and additional safety. Future indications are toward the use of fuels with even higher octane ratings in engines designed specifically for their use.

To facilitate the starting of engines in extremely cold weather, an oil dilution system was discovered which provides that the engine will be supplied with thin oil for starting purposes, changing to heavier oil when operation is accomplished. The method achieved in this discovery is so simple and practical that, although it has come but recently into use, it will prove of great benefit to commercial transport as well as military aircraft. The Air Corps has also developed several priming systems to facilitate cold weather starting.

The existence of destructive vibration forces set up by certain propeller-crankshaft combinations in high speed airplanes, at first a suspicion, later verified by research, was one of the


Airplane balances at end of each fiscal year
Number of Airplanes
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
Fiscal Years
1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939



AIRCRAFT RANGE OVER 30 YEAR PERIOD

Materiel Division's most important discoveries. The first task to be undertaken was the development of instruments for recording these vibrations. The problem was met by the development of a simple vibration damping mechanism by which the amplitude of vibration can be reduced to a value lying within the safety limits.

The first night airways system in the United States was flown between Columbus, Ohio, and McCook Field, Dayton, Ohio, in 1922. The information gathered from the establishment of this system and resulting development of equipment is reflected in current designs of navigation and landing lights, revolving beacons, boundary and obstacle lights, floodlights, and other lighting and airways accoutrements. All information was turned over to the Post Office Department for the inauguration of the night air mail service, even to equipping a sample air mail plane at McCook Field.

Navigation instruments have been objects of constant research and development since the organization of the Division. The sextant and the earth induction compass played an important part in early transoceanic flights. More recently the first solo blind landing and the first automatic landing in history were made by Air Corps officers assigned at the Materiel Division. These last two types of flying have an implication of navigation instrument development which speaks eloquently of progress to the informed mind.

The first radio beacon was developed at McCook Field by Signal Corps and Air Corps officers working in coordination. Likewise, the first known radio interview between a person in flight and one on the ground was accomplished there.

At McCook Field, the Air Corps in the early days paved the way for transition from the wood to the metal propeller, and more recently it has been responsible for bringing the constant speed, controllable pitch, full feathering types to the stage of practical usefulness. The Air Corps was the first to realize the importance of propeller gearing which earned for the airplane a portion of its improved modern performance characteristics. Research into the cause of metal propeller failures led engineers to the discovery of the deteriorating effects of vibration. Instruments were developed by which these vibrational effects could be studied. Information which was obtained in these studies not only led to the development of a method by which weakness in new propeller designs can be determined, prior to trial in flight, but which will undoubtedly be of great value for use in connection with the sound-proofing of airplanes. Experimentation with hollow steel blades and forged aluminum blades was the result of a search for new and improved materials, in order that the U.S. need never be hampered in mass production, in case such production became necessary.

Aerial photography, which is of prime importance in military air tactics, has advanced technically by leaps and bounds under Air Corps sponsorship. Highly sensitized haze penetration film came into existence at the instigation of the Air Corps. The United States was for many years the only country in the world using film instead of plates for aerial pictures. Development of high-speed panchromatic aerial film, which permits taking photographs under adverse conditions by the use of filters on the camera, was also initiated by the Air Corps. Snapshots and scenic views, of higher quality than heretofore have been obtainable with ordinary aerial film, have been made possible. Night aerial photography has also come into being through the efforts of the Air Corps, and at present equipment and processes for the production of color photographic transparencies are being developed which will enable Army personnel to detect camouflaged positions. Increased shutter speeds have been necessitated by the increased speeds of airplanes. These in turn require an increase in the lens and film speeds. Quick work developing and printing equipment makes possible complete processing and printing in four minutes' time. A photographic laboratory trailer has been standardized which can develop film and make prints in the field in which the airplane is operating, receiving the film from the pilot as he lands, and, in the brief period of time named above, giving him the finished prints which he can fly to headquarters.

These are but a few of the highlights in aeronautical development accomplished at the Materiel Division by the Air Corps. The Division has also served as a clearing house for the development of test methods, the design of test machinery and equipment, and the writing in report form of test results. The broad experience in handling materials and equipment has enabled its engineers to contribute basic information to the aeronautical science all along the way. These data, with the exception of a few that have been held confidential, have always been at the service of the aircraft industry, and test results obtained by the Division have been looked upon as the most thorough and accurate obtainable.

In this brief description of accomplishments, we have not entered into types of airplanes and engines produced. Charts show the increases in range and speeds accomplished. The influence of Division study and development may be seen, however, in all the details of

the remarkable cleaning up of design which the airplane has undergone in a comparatively short period of time, as well as in the marked advance in performance.

Before closing, it is desired to recall a few of the outstanding events which color the history of the Materiel Division.

In 1920, Major Rudolph W. Schroeder, in one of history's most spectacular flights, achieved a world's altitude record of 33,113 feet. At this peak altitude, his oxygen supply gave out. The thermometer registered 67 degrees below zero. The airplane in use at that time was the open-cockpit, unheated type. Major Schroeder lifted his frosted goggles to check the oxygen, lost consciousness, and with eyes swollen shut, plummeted to within a few thousand feet of the ground before being revived by the normal air density of the lower altitudes. Almost blind, he miraculously made a safe landing.

In 1921 and 1922, Lieut. John A. Macready, in a LePere biplane with supercharged Liberty engine, bettered Major Schroeder's record by about 1,450 feet. This world's record was extended in 1935 by Captain Albert W. Stevens and Captain Orvil A. Anderson to 72,395 feet. This flight was accomplished by these two Air Corps officers in an especially constructed balloon, Explorer II. The record has not been exceeded to date.

It is interesting to note that where Major Schroeder struggled with an airplane that rose foot by foot to the extreme altitude he was able to obtain, at the present time an airplane flight in the enclosed cabins or supercharged pressure cabins of some distance at 30,000 feet is a mere routine performance. This extension of altitude performance has been due largely to research and development of equipment accomplished by the Materiel Division.

In 1922, Lieut. Harold R. Harris jumped from an airplane which failed at 2500 feet, thus being the first of approximately 1050 persons whose lives have been saved by a parachute developed by the Army Air Corps at the Materiel Division. Before this development there was no parachute in the United States adequate for escape from heavier-than-air craft.

In 1923, Lieut. Harold R. Harris flew the Barling Bomber which, although it did not prove practical as a development because during its long construction period the aeronautical art advanced far beyond it, proved that great size in itself was no deterrent to flight and provided data on the building and handling of large aircraft.

In 1923, world's speed records were set by Air Corps pilots of McCook Field for 500, 1,000, 1,500, 2,000, 2,500, 3,000, 3,500 and 4,000 kilometers, in a series of aerial demonstrations that attracted national and international interest.

Noteworthy also in that year was the establishment of the world's endurance and distance records over a triangular course, the pilots (Lieuts. Macready and Kelly) remaining aloft 36 hours, 4 minutes, and 32 seconds. By this flight they proved that the Fokker T-2 monoplane was capable of remaining aloft a sufficient length of time and cover a sufficient distance to accomplish a nonstop transcontinental flight. They succeeded in making such a flight on May 2nd and 3rd of the same year, traveling from New York to California. The time required for this first aerial nonstop crossing of the continent was 26 hours, 50 minutes and 3 seconds. In January, 1937, a nonstop transcontinental flight from Los Angeles to Newark, New Jersey, was accomplished by Howard Hughes in 7 hours, 28 minutes, 25 seconds. That which was a pioneering effort, straining aircraft and equipment possibilities to the utmost in 1923, established a precedent to be broken thousands of times in the interim until today it has become mere routine.

In 1924, engineering requirements for the first Round the World Flight airplanes were drawn up by McCook Field engineers. This flight will always stand out as a glorious Air Corps accomplishment.

In the same year, Lieut. James H. Doolittle performed certain acceleration tests in which he risked his own safety to prove that the factors of safety laid down for Pursuit airplanes were not sufficiently high to provide proper protection against the failure of equipment in maneuvers with resulting loss of life. This was a major contribution to the structural development of military aircraft.

The radio beacon was a McCook Field development, and in 1925 the first radio beacon equipment was installed in an air mail plane for the Department of Commerce for use over the airways. In the same year, the first flashlight night photograph was made by Lieut. George W. Goddard with equipment developed at McCook Field.

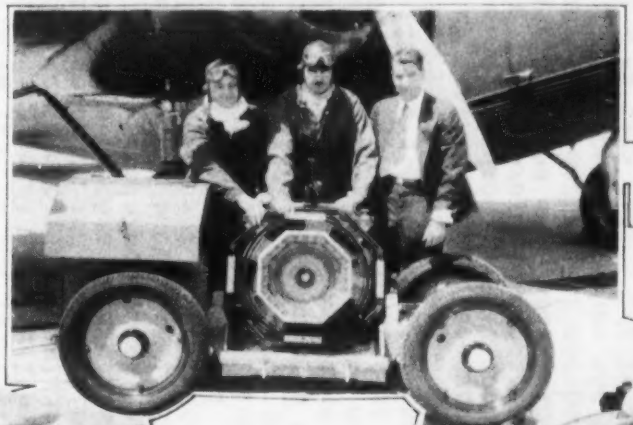
In 1927, Lieuts. Hegenberger and Maitland accomplished the first crossing of the Pacific Ocean from California to Hawaii.

In 1929, Major Albert W. Stevens took a long-distance aerial photograph of points as far distant from the airplane as 331 miles.

In 1937, the first experimental pressure cabin substratosphere airplane in the world arrived at Wright Field for test and research purposes. This airplane has proved highly successful. The B-15, the Army's largest Bombardment airplane, was delivered and flight tested the same year.

(Continued on Page 23).

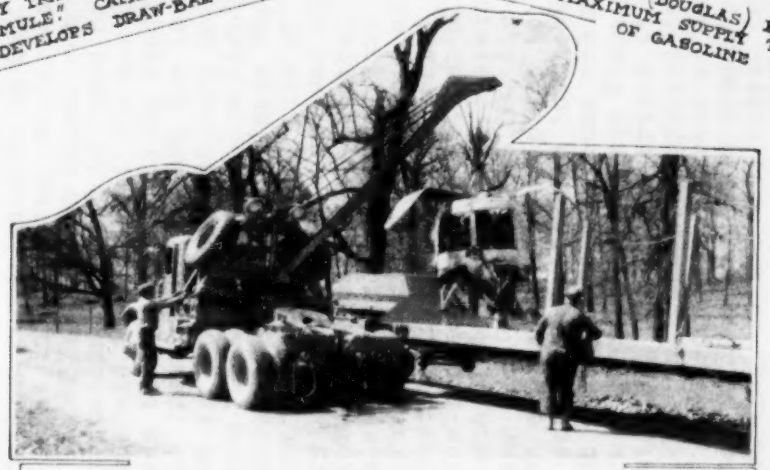
Some Notable Truck Developments



Small truck especially designed for bringing 9-lens mapping camera to airplane on field for installation.

This newly developed heavy-duty tractor for towing large airplanes. Known as "Iron Mule" capable of towing the largest airplane. Develops draw-bar pull in excess of 4600 pounds.

Refueling B-18 (Douglas) Bomber with 4000-gallon refueling truck. Maximum supply to an airplane tank, 400 gallons of gasoline per minute.



68 ft. wrecking truck for use with large aircraft. The truck has floodlights, 10-ton capacity boom, and underslung winch.

THE GHQ AIR FORCE

"Saw the heavens fill with commerce, Argosies of magic sails,
Pilots of the purple twilight, dropping down with costly bales,
Heard the heavens fill with shouting, and there rained a ghastly dew,
From the nations' airy navies grappling in the central blue."

Alfred Tennyson (1809 - 1892).

The meteoric rise of Air Power in the world of today has brought the GHQ Air Force into the focus of public interest. Organized on March 1,1935, and placed under the capable leadership of Major General Frank M. Andrews, Air Corps, in the brief period of four years it has achieved recognition as an important element in our defensive forces.

In 1933, the Drum Board, comprising outstanding general officers of the line and the Chief of the Air Corps, made the initial analysis leading to the creation of the GHQ Air Force. This new arrival in our national defense team fills the need for a highly mobile and powerful striking force that can be moved quickly from one part of the country to another. The present organization is the outgrowth of experience gained during the service test period.

The GHQ Air Force consists at the present time of all the combat squadrons located in the Continental United States. At present there are twenty-nine such units in the GHQ Air Force. The expansion program plans to effect a substantial increase in these units. The twenty-nine squadrons now available are organized into three Wings. The 1st Wing, with headquarters at March Field, California, comprises two groups of Bombardment, one group of Attack, and two Reconnaissance squadrons. The 2nd Wing, on the east coast, has its headquarters at Langley Field, Virginia. It comprises two groups of Bombardment, two of Pursuit, and two Reconnaissance squadrons. The 3rd Wing is located at Barksdale Field, Louisiana, and comprises one group of Attack and one group of Pursuit.

It is easy to think entirely of combat squadrons and forget that there must be an established system of service and supply to support air operations. This service and supply is rendered by the Air Base, a command which comprises the facilities and installations required for the operation, maintenance and supply of a specific air force. The Air Base normally includes a considerable area, since all the scattered auxiliary airdromes are under its control. The Air Base does much of the "housekeeping" for the combat units; it prepares all the facilities at the auxiliary airdromes in such a manner that the combat units may move in and start operations without further work. An Air Base exists for the primary purpose of providing the necessary service to the combat units. At the present time there are six such air bases for the GHQ Air force, namely: The first at Langley Field, Virginia; the second, at Mitchel Field, New York; the third at Selfridge Field, Michigan; the fourth at March Field, California; the fifth at Hamilton Field, California, and the sixth at Barksdale Field, Louisiana.

March 1, 1935, found the combat squadrons trained under the same general directive, but with diverse results as to proficiency in many details, with the result that combat units from different stations were unable to work together without a period of combined training. Attention was focused immediately upon uniform training directives and methods to the end that GHQ Air Force units now can and have been brought together with every assurance of satisfactory operation without further combined training.

The outstanding achievement in tactical training which has welded heterogeneous squadrons into a tactical command has been the success attending the development of the combat crew as a flying team. While the idea is not new, it was not extended to the airplane crew until the training of tactical air units was centralized under one command in the GHQ Air Force. Today, the measure of proficiency is that of the combat team as a unit rather than the separate proficiencies of the individual members thereof.

The proficiency of GHQ Air Force units has been tested in three GHQ Air Force exercises and many other exercises for the Wings and smaller units. Each exercise has shown progressive improvement as a result of continued training. This proficiency has been exemplified also in the accomplishment of numerous outstanding flights during the past year. Among such were the flight of six B-17's from Miami to Buenos Aires in 34 hours elapsed time; the flight of three B-17's from Miami to Bogota, Colombia, in 8½ hours; and the flight of the B-15 from Langley Field to Santiago, Chile, a distance

of 4300 miles in 26½ hours actual flying time. These long range flights, through extremes of weather hazards and under peculiar navigational difficulties, were executed with a precision which indicates the excellent training of our personnel and the reliability of our present equipment.

The GHQ Air Force is our nation's means of exerting "Air Power". The backbone of this air power is Bombardment Aviation, for that is the type which can exert direct pressure on an enemy through the destructive effect of its bombing; the other combat types - Attack, Pursuit, and Reconnaissance - are all vital and necessary, however, to play their roles as part of the complete Air Force team. The four-engined "Flying Fortress" is the first Bombardment airplane which has provided the necessary speed, range and bomb load to be effective at long range. It is also a powerful, short range weapon, for it has the capacity to permit the interchange of fuel and bombs, depending upon the radius of action desired. Its power plant provides a high degree of reliability, for the airplane can safely fly on but two of the four engines. Its reliability and range have been thoroughly demonstrated by many flights executed under every possible weather condition. The flights to Buenos Aires and Bogota were of great public interest, but not unusual in the superb performance of this airplane.

Air power is different from military or naval power, in that it may be applied directly against the enemy without first overcoming land or sea barriers, or the enemy's surface forces. Weather, anti-aircraft defenses and distance are the only deterrants. Weather has been largely overcome. Distance is shrinking under the new developments in airplanes. Anti-aircraft defenses can deter, but not positively prevent, an air attack. The capabilities of modern high speed, high performance aircraft, coupled with a wide choice in suitable objectives, makes effective interference with an attack once launched a difficult problem. Our best defense against such an effort is to prevent an enemy from launching an attack by striking him before he is well established on advanced bases. The multi-engined, high performance Bomber is the best weapon available today with which to perform this mission.

The last decade has seen the use of Air Power as an important factor in "strong arm" diplomacy, the modern version of the "big stick" of Theodore Roosevelt. Although the destructive effect and moral influence of modern bombardment has not yet been used on a majo scale, the great powers of Europe, which lie within easy bombing range of one another, are reluctant to bring this to a test. The general opinion of the threat of the modern Bomber can be deduced from the elaborate precautions that are being taken in the major cities abroad. We cannot view complacently our distance from Europe as an impregnable obstacle. Spectators who watched the trials of the Wright machine in 1909 could not, by any stretch of the imagination, visualize the "Flying Fortress" of today, nor the routine crossing of our oceans by huge clipper seaplanes. No more can we today imagine the potentialities of the aircraft of tomorrow.

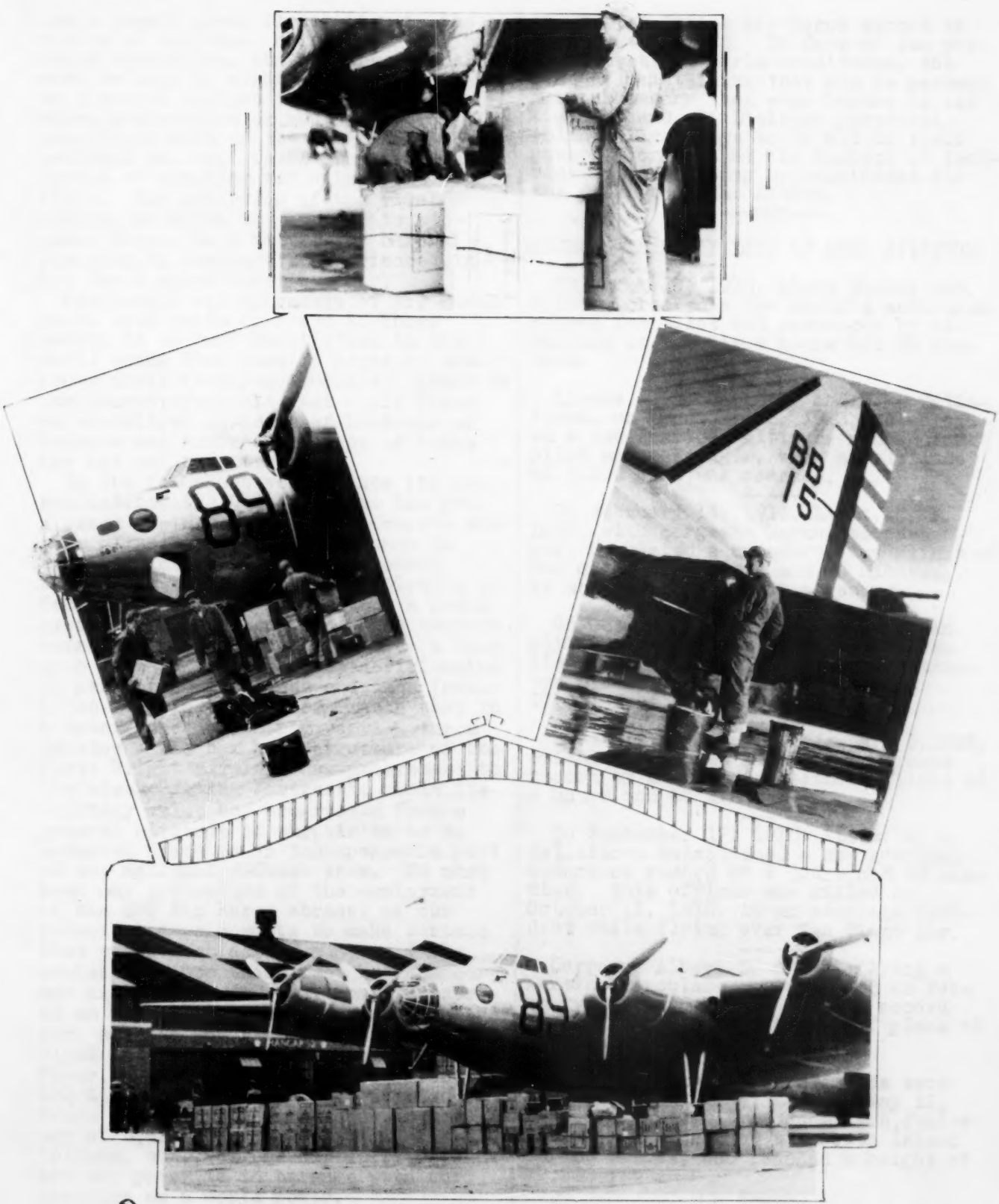
The GHQ Air Force was created to fill a definite role in our national defense team - a powerful force available on M-Day for any contingency. It is a national acceptance of the fact that Air Power has emerged from its swaddling clothes to take its place with the traditional military and naval powers.

In thinking of Air Power and of our GHQ Air Force, we must avoid the pitfall that airplanes alone, either in numbers or quality, are the measures of Air Power. There are three essential components: the airplane, trained combat crews and the necessary air bases with their service personnel to support the combat units. Unless three elements are all present and in the proper proportion, we do not have Air Power in its true form. The number of trained combat units which can take the air and operate effectively is the real measure of Air Power.

When first organized, the GHQ Air Force was directly under the Chief of Staff. On March 1, 1939, the chain of command, to simplify peace time procedure, was changed to place the GHQ Air Force under the Chief of the Air Corps.

The role of the GHQ Air Force in the National Defense is clearly defined in Training Regulations. It operates under GHQ as a powerful, mobile, striking force to assist the high command in accomplishing the national mission. It may engage in operations in close support of ground forces; in coastal frontier defense; in other joint Army and Navy operations; or in independent operations beyond the sphere of influence of ground forces. In any type of mission, cooperating with either the Army or the Navy, the GHQ Air Force is part of a team and attacks those objectives whose destruction or neutralization is vital to the success of the team as a whole.

The GHQ Air Force has its greatest scope in independent operations. The range and speed of modern combat air-



PREPARATIONS AT LANGLEY FIELD, VA., FOR THE FLIGHT OF THE XB-15 BOMBER WITH MEDICAL SUPPLIES FOR THE EARTHQUAKE SUFFERERS IN CHILE.

craft permit great flexibility in the choice of targets. Here, as in all military operations, the primary objective must be kept in sight - the force must be directed against those objectives whose destruction or neutralization will contribute most to the success of the national policy. There are always a myriad of tempting and vulnerable objectives. The selection of the vital points, on which to concentrate adequate force, is a matter for careful planning by commanders experienced in air force operations.

Proponents and opponents of Air Power point with pride or scorn to those events in current hostilities in the world today that seem to prove or disprove their favorite theories. There is one incontrovertible fact - Air Power as visualized in terms of hundreds of Bombers and hundreds of tons of bombs has not yet been tested.

In the few short years since its organization, the GHQ Air Force has progressed rapidly from a conglomerate mixture of units with wide variance in training into a homogeneous combat force. It is by no means completely effective as an M-Day force, but a sound ground work has been laid. The current expansion program should provide a long step forward in correcting deficiencies in personnel, airplanes and base facilities. It is truly remarkable that in a brief space of thirty years - three decades - the box kite structure of the first Wright airplane has progressed to the sleek "Flying Fortress", while its military value has progressed from a general attitude of skepticism to an accepted place as in indispensable part of our national defense team. We must keep our conception of the employment of the GHQ Air Force abreast of our technical developments to make certain that every such advancement is fully exploited. One thing must be remembered: military power today must be exerted on the sea, on the ground and in the air, and the GHQ Air Force is our principal instrument for exerting its Air Power. While the development of the GHQ Air Force has been well started, there remains much to be done in the way of equipment, organization, installations, etc., before our ability to exert air power is in balance with our position as a world power.

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History of the Materiel Division

(Continued from Page 20)

Since its founding, it has been the aim of the Materiel Division to aid in maintaining a technical position for the United States Air Corps second to none in the world. In face of the present unsettled world conditions, the need of maintaining that aim is perhaps more necessary than ever before in its history, and all Division personnel voluntarily pledge to do all in their power in order that the highest of technical standards may be maintained for the defense of the Nation.

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RECORDS IN EARLY DAYS OF ARMY AVIATION

On March 28, 1913, Lieut Thomas DeW. Milling created a new world's endurance record for pilot and passenger by remaining in the air 4 hours and 22 minutes.

Lieuts. J.E. Carberry and W.R. Taliaferro, on December 26, 1913, established a new American altitude record for pilot and passenger, when an altitude of 7,000 feet was reached.

On February 14, 1914, Lieut. T. F. Dodd, with Sergeant Marcus as passenger, completed a cross-country flight of 246 miles in 4 hours and 43 minutes, establishing an American record.

On October 8, 1914, a new American altitude record was established when Lieut. H.L. Muller, in a Curtiss tractor plane, reached an altitude of 17,441 feet.

Lieut. B.Q. Jones, on January 5,1915, established a new American endurance record by making a continuous flight of 8 hours and 50 minutes.

On September 17, 1915, Lieut. W. R. Taliaferro established a new American endurance record of 9 hours and 48 minutes. This officer was killed on October 11, 1915, in an airplane accident while flying over San Diego Bay.

Corporal Albert D. Smith, flying a Martin hydroplane, established on February 10, 1916, a new world's record for endurance for that type of plane of 8 hours and 42 minutes.

American records for altitude were broken at San Diego, Calif., May 12, 1917, by Captain W.A. Robertson,Junior Military Aviator, at the North Island Flying School, who reached a height of 17,230 feet.

Apropos of the above altitude record of Captain Robertson, it is interesting to note that in the year 1937 - 20 years later - a British airman exceeded it by more than three fold, when he ascended to 53,936 feet. This heavier-than-air altitude record was officially recognized by the F.A.I.

MILESTONES OF THIRTY YEARS IN U.S. ARMY AVIATION

FOREWORD

These "Milestones" along the path of progress in U.S. Army Aviation have been selected to emphasize the pioneering work of the U.S. Army Air Corps in applying the airplane to both army and civilian uses and in the field of technical research.

The "Old Timer" looks back with nostalgic recollection on the activities of the early twenties. The uncertainty of wartime equipment and the almost daily establishment of new records filled each day with romance and adventure. The pioneering work of those early days has brought forth our sleek, reliable, high-performance aircraft of today. The deeds of the pioneers, who often gambled their lives on their skill and judgment, would fill volumes. Their omission here does not minimize their importance.

1907

July 1. Aeronautical Division established in the Office of the Chief Signal Officer of the Army.

December. The Signal Corps issued specifications and called for bids for an airplane which would carry two occupants, fly for one hour, and make a speed of 40 miles an hour.

1908

Sept. 3. Orville Wright flew his airplane at Fort Myer, Va. In one of the test flights, Lieut. Selfridge, his passenger, was killed and Mr. Wright was severely injured.

1909

July 30. Orville Wright, with Lieut. B.D. Foulois as passenger, successfully accomplished the speed test flight over a five-mile course from Fort Myer, Va., to Alexandria, Va., and return. Shortly thereafter, with Lieut. Frank P. Lahm as passenger, Mr. Wright successfully accomplished the endurance test, establishing a world's record of one hour and 12 minutes for a plane with two occupants.

August 2. The Aeronautical Board, Signal Corps, U.S. Army, held a formal meeting and recommended the acceptance of the Wright airplane. These proceedings were approved by the Chief Signal Officer on the same date.

1911

March 3. Congress, for the first time, specifically appropriated funds for aeronautics in the Army, the total sum being $125,000, with $25,000 made immediately available.

1914

July 18. The Aviation Section, Signal Corps, was established, with an authorized personnel of 60 officers and 260 enlisted men.

Sept. 1. The First Aero Squadron was organized at San Diego, Calif., with personnel of 16 officers and 77 enlisted men, and equipment comprising 8 airplanes.

1916

March 15. The First Aero Squadron began operations with the Punitive Expedition in Mexico.

July 1. The National Defense Act of June 3, 1916, authorized 148 officers and 4,000 enlisted men in the Aviation Section, Signal Corps. An officer and an enlisted Reserve Corps was authorized.

1917

April 6. When the United States entered the World War, the Aviation Section, Signal Corps, comprised 35 pilots, 1087 enlisted men, and 55 training airplanes.

Sept. 1. The First Aero Squadron, which had been assigned to the First Division shortly after the declaration of war, arrived in France.

July 24. Congress appropriated $640,000,000 with which to proceed on a gigantic aviation program.

1918

May 21. A radical change was effected in the organization of the U.S. Aviation Service. All aircraft activities were divorced from the Signal Corps, and two new aviation departments created - the Bureau of Military Aeronautics and the Bureau of Aircraft Production.

1919

April 16. Major T.C. Macauley, piloting a DH-4 airplane, arrived at Souther Field, Americus, Ga., from San Diego, Calif., a distance of 2400 miles, in 19 hours' flying time, completing round trip flight in 44 hours and 15 minutes.

July 12. In a night flight, Lieut. C.C. Chauncey, in a LePere airplane, attained an altitude of 20,000 feet at Arcadia, Fla.

Nov. 9. Lieut. Colonel R.L. Hartz and Lieut. E.E. Harmon, in a Martin Bomber, started at Bolling Field on July 24th, and completed the circuit of the United States, covering 9,823 miles.

October 4. Major R.W. Schroeder, pilot, with Lieut. George W. Elsey, observer, reached an altitude of 31,796 feet in a LePere airplane at McCook Field, Dayton, Ohio.

October 8-30. The New York - San Francisco Reliability Test Flight was held.

1920

January 20. Radio messages from airplanes were successfully received at a distance of 175 miles during maneuvers of the 37th Infantry at Fort McIntosh, Texas.

February 27. A world's altitude record of 33,000 feet was established by Major R.W. Schroeder in a LePere airplane.

June 4. The Army Reorganization Bill was approved, creating an Air Service with 1516 officers and 16,000 enlisted men.

October 20. A flight, starting on July 15th, from New York to Nome, Alaska, and return, a distance of 9,329 miles, was successfully accomplished by Army aviation personnel in four DH-4 airplanes, under the leadership of Captain St. Clair Streett.

November 25. Piloting a Verville airplane, powered with a 500 h.p. Packard engine, Lieut. C.C. Moseley won the Pulitzer Race when he covered 116208 miles in 44 minutes and 29.6 seconds, or at an average speed of 178 miles per hour.

1921

February 12. The Army Air Service opened the

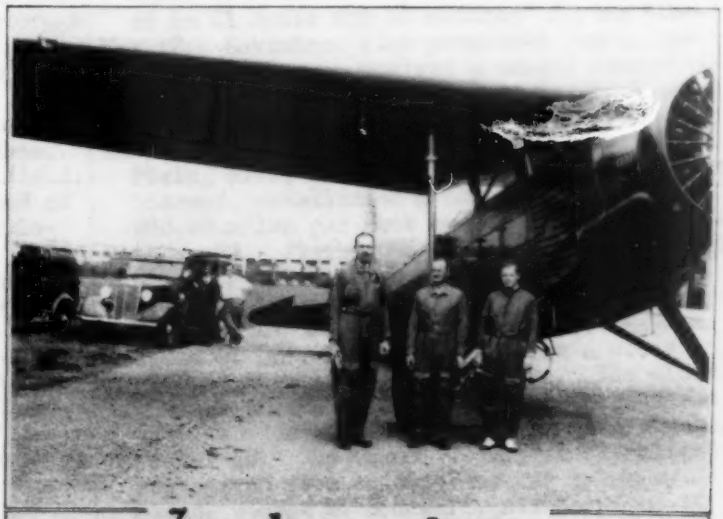
First Pacific Flight

LIEUTENANTS A. F. HEGENBERGER AND LESTER D. MAITLAND BESIDE THE AIR CORPS "BIRD OF PARADISE." FIRST CROSSING OF PACIFIC FROM CALIFORNIA TO HAWAII, JUNE 28-29, 1927.

First Around The World

LEFT TO RIGHT: MAJOR JOHN F. CURRY AND LIEUTENANTS SMITH, OGDEN, NELSON, WADE, HARDING AND ARNOLD.

FLIGHT COMPLETED SEPTEMBER 28, 1924.



First Automatic Landing

FIRST COMPLETELY AUTOMATIC LANDING IN HISTORY - AUGUST 23, 1937. ACCOMPLISHED BY CAPT. CARL CRANE, CAPT. G. V. HOLLOMAN AND RAYMOND STOUT.

first airway from Washington, D.C., to Dayton, Ohio.

February 24. Lieut. Wm. D. Coney made a transcontinental flight from San Diego, Calif., to Jacksonville, Fla., a distance of 2180 miles, in a flying time of 22 hours, 27 minutes. Two stops were made enroute.

August 4. The novel experiment of spraying poison powder from an airplane over a grove of trees, practically defoliated through the ravages of worms, was successfully conducted by Lieut. John A. Macready.

Sept. 1. The Army Air Service successfully completed a forestry patrol project in the Pacific Northwest, 398 patrols being flown, during the course of which 832 fires were discovered by the 47 planes in commission.

Sept. 28. Lieut. John A. Macready, piloting a LePere airplane at McCook Field, Dayton, Ohio, reached an altitude of 37,800 feet.

1922

June 16. Lieut. Clayton Bissell completed the first successful night cross-country flight from Bolling Field, D.C., to Langley Field, Va., and return.

Sept. 25. Lieut. James H. Doolittle made a flight from Jacksonville, Fla., to Rockwell Field, Calif., in a flying time of 21 hours and 20 minutes. One stop of an hour and 15 minutes was made at Kelly Field, Texas, for servicing.

October 2. Lieuts. Oakley G. Kelly and John A. Macready established a world's endurance record of 35 hours, 18⅔ minutes, at McCook Field, Dayton, Ohio.

October 14. Lieut. Russell L. Maughan won the Pulitzer Race, when he established an average speed record over a course totaling 155.34 miles of 205.8 miles per hour. He flew an Army Curtiss Racer.

October 18. In the Army Curtiss Racer flown by Lieut. Maughan in the Pulitzer Trophy Race, General William Mitchell, at Selfridge Field, Mich., established a world's speed record of 224.38 miles per hour over a measured kilometer course.

November 4. The world's record for non-stop flight was established by Lieuts. Cakley G. Kelly and John A. Macready in the T-2 airplane, when they flew a distance of 2060 miles from San Diego, Calif., to Fort Benjamin Harrison, Ind., where a forced landing was made due to an overheated engine. This flight was originally intended to be non-stop across the continent.

1923

April 3. Twelve Air Service pilots, commanded by Captain Thomas G. Lanphier, completed a trip from San Antonio, Texas, to San Juan, Puerto Rico, and return to Bolling Field, D.C., accomplishing one of the most remarkable flights in the history of American aviation.

April 19. Eleven persons, marooned and reported starving on South Fox Island, Mich., were afforded relief through supplies of food and clothing dropped to them from Army aircraft.

May 2. Lieuts. Oakley G. Kelly and John A. Macready, piloting the T-2 airplane, flew nonstop across the continent from Mitchel Field, N.Y., to San Diego, Calif., the distance of approximately 2520 miles being covered in 26 hours, 50 minutes, 38-2/5 seconds.

August 27. By means of refueling their plane while in the air, Lieuts. Lowell H. Smith and John P. Richter established at Rockwell Field, Calif., a new world's duration record of 37 hours, 15 minutes, 14-4/5 seconds; also six speed records covering distances of from 2500 to 5000 kilometers.

1924

March 4. Army airplanes were used to avert a serious flood by bombing ice jams in the Platte River, Nebraska, thereby clearing a channel for the passage of water.

March 17. Four Douglas World Cruisers of the Army Air Service departed on the around the world flight. Two of the four pilots successfully completed the distance of 27,553 miles, the globe-encircling journey requiring 175 days.

June 23. Lieut. Russell L. Maughan, in his projected Dawn to Dusk Flight, from the Atlantic to the Pacific coast, covered the distance of 2540 miles from New York to San Francisco in 21 hours, 48½ minutes.

1925

January 24. Army pilots at several Air Service fields, and flying at altitudes ranging from 16,000 to 19,000 feet, made successful photographs of the eclipse of the sun.

March 9. Twelve Pursuit planes of the 1st Pursuit Group, Selfridge Field, Mich., completed the longest flight ever made by that number of planes. The distance of 2,840 miles to Miami, Fla., and return, was covered in 21 hours and 35 minutes' flying time.

May 12. Seventeen live parachute jumps, one after another, comprised a unique demonstration by the Air Corps Technical School at Chanute Field, Rantoul, Ill.

October 12. In the Pulitzer Race at Mitchel Field, N.Y., Lieut. Cyrus Bettis, the winner thereof, established a new speed record of 248.99 miles per hour over a closed circuit.

October 26. Flying the Curtiss Racer in which Lieut. Bettis won the Pulitzer Race, Lieut. James H. Doolittle won the Schneider Cup Race at Baltimore, Md., when he averaged a speed of 232 miles per hour over a closed circuit totaling 350 kilometers. The plane was transformed into a seaplane through the substitution of pontoons for landing wheels.

November 20. The first successful flashlight photograph from an airplane was taken by Lieut. George W. Goddward, Air Service, at Rochester, N.Y. A Martin Bomber, equipped for night flying, was utilized for the experiment.

1926

January 29. Successful radio communication between a Martin Bomber flying at night above Dayton, Ohio, and Station WLW, Cincinnatti, Ohio, was conducted.

May 3. A total of 45 officers, 67 enlisted men, utilizing 44 airplanes, participated in the aerial maneuvers at Wright Field, Ohio, which started on April 19th.

July 2. Twenty-four bags of tree seeds were dropped from an Army airplane flying over forest reserve lands in Hawaii which had

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July 2. Congress authorized a five-year expansion program to increase the Air Service personnel to 1650 officers and 15,000 enlisted men, and the equipment to 1800 serviceable planes. A change in designation from "Air Service" to "Air Corps" was effected.

1927

April. Army Air Corps and National Guard pilots performed commendable work in connection with relief measures incident to the disastrous Mississippi flood.

May 2. The Pan American fliers landed at Bolling Field, D.C., terminating their 20,500-mile "Good Will" flight around South America. The flight started from San Antonio, Texas, on December 21, 1926.

May 4. Piloting a free balloon, Captain Hawthorne C. Gray, Air Corps, reached an altitude of 42,470 feet.

June 29. Lieuts. Lester J. Maitland and Albert F. Hegenberger, Air Corps, successfully negotiated the flight of 2,400 miles over the Pacific Ocean from Oakland, Calif., to Honolulu, Hawaii.

October 12. The new Wright Field at Dayton, Ohio, was dedicated with impressive ceremonies.

1928

March 9. Lieut. Burnie R. Dallas, Air Corps, was the first airplane pilot to fly an amphibian plane across the American continent. Five stops were made enroute, and the total distance of 3300 miles was covered in a flying time of 32 hours and 45 minutes.

May 10. An Army TC airship made a successful landing on the deck of a steamer about three miles off Ambrose Light, N.Y., transferring some cargo and then taking off again without halting the vessel.

May 16. A total of 73 Army planes flew above Fort Sill, Okla., executing combat formations in cooperation with the Field Artillery School of Fire at that post.

May 16. Two PW-9 Pursuit planes, piloted by Lieuts. Robert W. Douglass, Jr., and James E. Parker, landed at Bolling Field, D.C., after completing a flight of 3815 miles from the Panama Canal Zone - the longest cross-country flight ever undertaken in single-seater Pursuit planes.

June 30. The Army Air Corps Team (Captain Wm. E. Kepner, pilot, and Lieut. Wm. O.Eareckson, aide) won the International Balloon Race, thus giving the United States permanent possession of the Gordon-Bennett Trophy, since American aeronauts won this contest on two previous occasions.

October 10. Captains St. Clair Streett and Albert W. Stevens, during a photographic altitude flight, ascended to 37,854 feet, establishing a new record for a two-man altitude flight.

1929

Jan. 1-7. Flying over the Los Angeles airport, the Army Air Corps transport plane "Question Mark" established an endurance record through the medium of refueling operations during flight of 150 hours, 40 minutes and 15 seconds.

April 18-21. Capt. Walter F. Kraus and 1st Lt. John E. Upston, in an Observation plane, flew from Bolling Field, D.C., to Havana, Cuba, and return. The south bound flight was accomplished in 13 hours, 25 minutes, and the return flight in 11 hours.

July 18-19. Captain Ross G. Hoyt made a flight from Mitchel Field, N.Y., to Nome, Alaska, and return. The trip from New York to Nome was accomplished in a flying time of 30 hours, and elapsed time of 48 hours. The return flight terminated in a forced landing at Valemount, British Columbia.

August 12. The first successful colored motion pictures from the air were taken by Captain Albert W. Stevens, who was piloted by Lieut. John D. Corkille. Later, on August 31st, Captain Stevens photographed Mt. Rainier from a distance of 227 miles, exceeding by 50 miles any previous record.

September 24. Lieut. James H. Doolittle made the first public demonstration of "Blind Flying," involving a take-off and landing solely by instruments.

1930

January 29. The First Pursuit Group returned to Selfridge Field, Mich., after nearly a month spent in a winter test flight to Spokane, Wash.

April 1-24. Air Corps exercises were held at Mather Field, Calif., under the command of Brigadier General Wm. E. Gillmore, Air Corps, for the purpose of demonstrating the use of an air force to repel invasion.

May 4. Captain Albert W. Stevens succeeded in taking a photograph, covering a distance of 270 miles, in one single exposure, during the course of a flight 20,000 feet aboce Crater Lake, Oregon.

June 20-21. Randolph Field, Texas, was dedicated.

1931

May 18-30. Army Air Corps Field Exercises by the First Air Division began at Dayton, Ohio, and ended at Washington, D.C. The First Air Division consisted of 692 officers, 69 Flying Cadets, 643 enlisted men and 667 planes of all types. The Division Commander was Brigadier General Benjamin D. Foulois.

November 3. The first cross-country flight at an altitude of 20,000 feet, in which all pilots used liquid oxygen, was completed by the 94th Pursuit Squadron. The flight from Selfridge Field to Washington, D.C., required two hours and five minutes.

1932

January 17-21. Six Army Bombing planes from March Field, Calif., dropped food and other supplies to snow-bound Navajo Indians in the district of Winslow, Arizona, who had become isolated due to the unusual severity of the snowstorm.

January 31. An aerial photograph of Mt. Shasta was made from a distance of 331.2 miles and from a height of 23,000 feet. This constituted the greatest amount of the earth's surface ever covered in one exposure.

May 9. Captain Albert F. Hegenberger made the first "blind" solo flight, at Dayton, Ohio, seeing nothing but the instruments before him from take-off to landing. He did not have a check pilot aboard, as was the case when

Lieut. Doolittle accomplished his "blind" flight in September, 1929.

1933

January 5-8. The Eighth Pursuit Group, with 39 Pursuit planes, participated in the Air Races at Miami, Fla.

February 2. The Army Air Corps officially dedicated Barksdale Field, Shreveport, La.

May 8-June 4. The Air Corps West Coast Exercises for 1933 were held under the command of Brigadier General Oscar Westover, with March Field, Calif., as headquarters. A total of 322 planes was utilized in these exercises.

May 29. The first class of aviators ever to be qualified as "instrument landing" pilots completed their course of instruction and demonstrated their expertness in this form of flying at Wright Field, Ohio.

1934

July 19. A flight of ten Martin B-10 Bombers, with 14 officers and 16 enlisted men, commanded by Lieut. Colonel Henry H. Arnold, took off July 19th from Washington, D.C., for Fairbanks, Alaska, which place was reached at 11:30 a.m. on July 24th. The approximate distance of 4,000 miles was covered in 25 hours, 30 minutes, actual flying time. Taking a different route, the flight returned to Washington on August 20th, the distance of 4290 miles being covered in 26 hours' actual flying time.

July 28. Major Wm. E. Kepner, Captains Albert W. Stevens and Orvil A. Anderson, flying in a substratosphere balloon, reached an altitude of 60,613 feet. The fabric began to rip, and the velocity of the balloon's descent was such that at about 5,000 feet the aeronauts took to their parachutes. They landed safely.

December 27. The Secretary of War announced his approval of a test organization of the GHQ Air Force. Lieut. Colonel Frank M. Andrews was designated as commander thereof, with headquarters at Langley Field, Va.

1935

February 4. The 2nd Bombardment Wing, Langley Field, Va., returned to its home station after 27 days of field maneuvers in the 4th Corps Area.

Feb. 1-28. The First Pursuit Group, Selfridge Field, Mich., operated the entire month in the northern States where snow and ice last during the entire winter season.

March 1. The General Headquarters Air Force was officially organized, and its Commander, Lieut.-Colonel Frank M. Andrews, was given the temporary rank of Brigadier General.

April 13. In the maneuvers of the 1st Wing, GHQ Air Force, ninety tactical airplanes from Hamilton, Rockwell, March and Brooks Fields were utilized.

May 12. The new Air Corps post of Hamilton Field, San Rafael, Calif., was officially dedicated. The field was named in honor of 1st Lieut. Lloyd Andrews Hamilton, who was killed in action overseas during the World War.

May 21. A tract of 2500 acres, near Fort Kamehameha, Hawaii, to be used as the site for an Army Flying Field, was named "Hickam Field," in memory of the late Lieut. Colonel Horace M. Hickam, Air Corps, who was killed in an aircraft accident at Fort Crockett, Texas, November 5, 1935.

August 29. Army Air Corps engineers made the first flight, using the radio compass to control the automatic pilot. A Martin Bomber, equipped with a Sperry automatic pilot and the radio compass, developed by the Air Corps, was flown, with additional apparatus combining these two devices. After the gyro pilot is engaged and the radio compass is tuned to a selected radio transmitted, the airplane proceeds to that station irrespective of its heading just prior to that time.

November 3-17. All of the Air Corps units and of the Coast Artillery (Anti-aircraft) on the West Coast participated in field exercises at widely scattered points in the San Joaquin valley. The Air Corps participated to the extent of 131 officers, 1348 enlisted men, with over 80 airplanes.

November 11. In a stratosphere flight, sponsored by the Air Corps and the National Geographic Society, Captains Albert W. Stevens and Orvil A. Anderson, Air Corps, piloting the world's largest balloon, attained an altitude of 72,395 feet for the world's record.

December 2. The 7th Bombardment Group from Hamilton Field, Calif., comprising 29 bombing planes, made a record for a mass flight when the distance from that field to Vero Beach, Fla., was accomplished in the elapsed time of 21 hours and 50 minutes.

December 27. Bombing operations from five Army planes on a lava flow from the Mauna Loa volcano in Hawaii proved successful in diverting the course of the flow which had threatened to envelop the town of Hilo.

1936

February 28. The largest mass flight of U.S. Army planes made to a possession beyond the continental limits of the United States was completed with the arrival in the Panama Canal Zone of 13 Pursuit and 11 Bombardment planes.

March. During the flood in the State of Pennsylvania, the 2nd Bombardment Group, Langley Field, Va., performed relief missions by dropping food and other supplies to isolated communities. During the preceding month, the 49th Bombardment Squadron, Langley Field, dropped packages of food to the inhabitants of Tangier and Smith Islands who were facing starvation due to ice floes in Chesapeake Bay which prevented assistance from reaching them by water.

February 1-15. Air Corps personnel from Barksdale, Langley, Mitchel and Selfridge Fields, organized as a provisional group, were engaged in conducting cold weather tests of clothing and equipment in the New England area. The airplanes were in the open without the facilities and protection of heated hangars.

August 12. The War Department issued instructions governing the reorganization of the Army Air Corps within the continental limits of the United States incident to the reorganization of the GHQ Air Force. Under the GHQ Air Force organization, various units

were reorganized and redesignated, and new organizations constituted from the station complements which were abolished. Nine Base Headquarters and Air Base Squadrons were created.

September 8. Ground was broken for the construction of Sacramento's new $7,000,000 air repair depot.

1937

February 11. The 96th Bombardnebt Squadron, 2nd Bombardment Group, equipped with B-10B airplanes, made a flight from Langley Field, Va., to Albrook Field, Panama Canal Zone, thus completing the longest over-water navigation flight yet performed by a formation of land planes.

May 1-30. The GHQ Air Force concentrated in the Hamilton Field - March Field areas and conducted operations therein with the purpose in view of testing the full strength organization of the various units of the GHQ Air Force as set up by the tentative tables of organization. Personnel engaged in the maneuvers totaled 425 officers and flying cadets and 3,400 enlisted men, the equipment comprising 260 airplanes.

June 24. Three B-10B planes were flown from Mitchel Field, N.Y. to San Juan, Puerto Rico, and return. The flying time between these two points totaled 29-3/4 hours, the distance involved being 4,395 miles. Most of the flying was performed over water.

August 5. The Army's new substratosphere airplane, the Lockheed XC-35, made its initial performance flights at Wright Field,O.

August 23. Two wholly automatic landings climaxed the work of Air Corps engineers to combine radio aids and the automatic pilot which involved over two years of intensive research.

September 12. A routine training flight was made by the 20th Pursuit Group, comprising 27 single-seater Boeing fighters, from Barksdale Field, La., to Buffalo, N.Y., in an elapsed time of 12 hours and 10 minutes. Two stops were made for refueling.

November 2. In the pressure cabin substrator sphere plane, Air Corps officers of Wright Field, flying at altitudes between 19,000 and 21,000 feet, covered a distance of 220 miles from Chicago to Dayton in 38 minutes, averaging a speed close to 350 miles per hour.

1938

February 10. The Departments of Photography and Armament were moved from the Air Corps Technical School, Chanute Field, Ill., to the branch of that School at Lowry Field, Colo.

February 27. Six B-17 "Flying Fortresses" returned to Langley Field, Va., from a "Good Will" Flight to Buenos Aires, Argentina. The southward flight was made in a flying time of approximately 33½ hours, and the return flight in 33 hours, 45 minutes.

March 14-31. Tactical Squadrons of the 2nd Wing, GHQ Air Force, concentrated in Florida for annual field exercises.

March. During the disastrous flood in Southern California, Air Corps personnel from March Field, Calif., aided in rescue work and performed various other missions to help relieve the situation.

February 9. Pilots of the 27th Pursuit Squadron, 1st Pursuit Group, Selfridge Field, Mich., began a 4,600-mile aerial journey which took them through 16 States.

April 20. The first school to be operated in this country for military flying training and maintenance of the Autogyro began at Patterson Field, Fairfield, Ohio.

May 18. GHQ Air Force maneuvers on the East Coast were completed. During the course thereof, 19 temporary air bases were utilized. Statistics disclosed that 2,285 airplane hours were flown in actual operations, involving 340,254 miles. All three Wings of the GHQ Air Force participated.

June 12. Three B-17 airplanes of the Second Bombardment Group, Langley Field, Va., while on a routine training flight, intercepted a steamer about 300 miles out at sea and then returned to the home airdrome.

April 14. During a period of four days tests were conducted in the Big Bend District of Texas on the practicability of utilizing an airplane to drop food for personnel and grain for animals of a Cavalry detachment in an assumed isolated mountainous region.

August 8-15. The 1st Wing, GHQ Air Force, moved to the Pacific Northwest to engage in long range reconnaissance missions and to familiarize personnel with the terrain and available military facilities throughout the Northwest area.

August 3-12. Three B-17 airplanes of the 2nd Bombardment Group, Langley Field, Va., were flown on a "Good Will" Mission to Bogota, Colombia.

October 3-17. Joint anti-aircraft - Air Corps Field Exercises were held at Fort Bragg, N.C., and its vicinity, the Air Corps organizations participating being 3 Pursuit Squadrons and one Hqrs. Squadron from the 8th Pursuit Group; one Pursuit Squadron from the 1st Pursuit Group; the 2nd and 9th Bombardment Groups, a Reconnaissance Squadron; an Attack Squadron from the 3rd Wing and a Bombardment Squadron from the 1st Wing.

May. During the GHQ Air Force Maneuvers on the East Coast, three B-17 Bombing planes were flown 750 miles out to sea to intercept an ocean liner. The steamer was sighted after four hours of flying, and after the places circled the vessel they returned to Mitchel Field on schedule time, despite adverse weather conditions.

July 28. First Lieut. Harold L. Neely, Air Corps, flew a Seversky P-35 Pursuit plane across the continent at a speed of approximately 278 miles per hour. Three stops were made for refueling. The actual flying time of the flight was 9 hours and 54 minutes, and the elapsed time 11 hours and 29 minutes.

October 26. Lieut. Benjamin S. Kelsey, Air Corps, flew a new Army Pursuit plane from Dayton, Ohio, to Buffalo, New York, at an average speed of 350 miles per hour.

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DEVELOPMENT OF COMBATANT AVIATION IN THE UNITED STATES ARMY

By Colonel Frank M. Andrews

It is a far cry from the role of the first military airplane to the role of the GHQ Air Force in national defense today.

When the Wright Brothers in 1909 turned over to the Army the first airplane built to military specifications, this "flying machine", as it was called, was viewed only as a means of increasing the scope of ground reconnaissance. This was its role for six years, and would probably have remained its role for many years to come had not a major war intervened. But along came the World War, and within three months the airplane was developed into a deadly instrument of war, capable of delivering its fire far beyond the range of any previous weapon. One of the teachings of history - that it takes a major war to develop a new weapon - was again confirmed.

From the fast single-seater airplane employed during the World War against other airplanes in the air was evolved our present Pursuit type of combatant aviation. From the large, cumbersome and slow "Night" Bomber was evolved our present Bombardment type. From the smaller, faster, "Day" Bomber came our present Attack type.

Truly remarkable has been the development made in these weapons since the World War. Speed, climb, range, load, reliability - all have been multiplied many times. Throughout the history of aeronautical development, the requirements of the military combatant airplane have been the constant and insistent urge behind the steady progress in design and performance. Military airmen have pioneered in the mastery of the air. In our own Army we have led the way in many phases of aviation - night flying and lighting of airdromes; weather reporting service; refueling in the air; radio communication between ground and airplane; aerial photographic surveying; "blind" or instrument flying and radio ranges; the first transcontinental flight, dawn to dusk flight, flight from the mainland to the tiny target of Hawaii, flight around the world, and recently, Miami to Lima nonstop - all of these, seemingly, "stunts" at the time, have contributed to the development of combatant aviation.

We have seen the all-purpose single-seater Pursuit plane of Rickenbacker's day develop into "interceptors" capable of climbing to 15,000 feet in 6 minutes, with 8 machine guns mounted in the wings; into two-place "protectors" of considerable range; into two-engined "fighters" bristling with cannons and machine guns.

Observation aviation has changed to autogiros for front-line work and to four-engined types for long-range reconnaissance. Attack aviation, whose low flying mission during the World War was performed by any and all airplanes available to a commander, has been provided with a varied assortment of airplanes during the past twenty years. The fast, single-engined airplane has predominated but both fast two-engined types and slower armoured types have been tried. If low flying tactics are to be continued, some armour seems necessary even if sufficient only to give protection to the crew and the fuel tanks. The next few years will probably see radical changes in this type.

Bombardment aviation has undergone the greatest change of any type in existence at the close of the World War. More than any other it has profited by the advances made in airplane design and performance, in aids to navigation, in bomb sights, in weather forecasting and in instrument flying. Its capabilities bear little resemblance to those of the Caproni or the Handley-Page of wartime fame. Developments of the past few years indicate that the era of the really large, high performance airplane is not far off. When that era dawns, we can no longer sit back and view with complacence the broad expanses of water guarding our coasts.

Aside from scientific development, combatant aviation has benefited from improved organization and control. For many years, the tactical air units were under the jurisdiction of the nine Corps Area Commanders, which meant that unity of command, coordination of training and uniformity of tactics were impossible. Upon the recommendations of the Baker Committee and through the efforts of General MacArthur, all combatant aviation in this country was organized under a single commander in March, 1935. This unit was christened the GHQ Air Force, and placed under the direct control of the Chief of Staff.

Modern air operations, involving as they do highly technical equipment, high speed, great altitudes, and all kinds of weather require that pilots, navigators and bombers achieve a state of training far beyond that required only a few years ago. It has made imperative the rigid adherence to the "combat team" system of training and operations; that is, a regularly assigned crew for each

(Continued on Page 32)

THE SCHOOL OF AVIATION MEDICINE

The School of Aviation Medicine had its origin during the World War as the Medical Research Laboratory, located at Hazelhurst Field, Mineola, L.I., New York. The functions of that organization were:

1. To investigate all conditions which affect the efficiency of pilots.
2. To institute and carry out, at flying schools and elsewhere, such experiments and tests as would determine the ability of pilots to fly at high altitudes.
3. To carry out experiments and tests as necessary to provide a suitable oxygen supply apparatus to be used by pilots at high altitudes.
4. To act as a standing Medical Board for the consideration of, and instruction in, all matters relating to the efficiency of pilots.

In the year 1919, the name was changed to The Medical Research Laboratory and School for Flight Surgeons, and in May of that year, after an eight weeks' course, the first class of Flight Surgeons was graduated. In November, 1919, the School was moved to Mitchel Field, Long Island, and in December, 1922, the name was changed to the School of Aviation Medicine. Owing to the availability of teaching material (trainees for flying) at San Antonio, Texas, the School was moved to Brooks Field in 1926 and later, in 1931, to Randolph Field, its present location.

The personnel of the School of Aviation Medicine includes a commandant, assistant commandant, adjutant, executive officer, instructors, enlisted men, civilian clerks and technicians. It is made up of four departments: Opthalmology and Otology, Aviation Medicine, Psychology, and Neuropsychiatry, each one in charge of a director.

The instruction and training which the School gives to officers of the Medical Corps of the Regular Army, Navy, National Guard and Reserve, cover in general:

(a) The organization and administration of the Medical Department as related to special requirements of the Air Corps;

(b) The principles and technique of physical examination for flying training and tests of fliers;

(c) The application of tests for physical efficiency;

(d) The physical care of fliers;

(e) Medical specialties as related to aviation medicine, including neuropsychiatry, physiology, opthalmology, otology, psychology and cardiology. The instruction and training given to selected enlisted men for specialists' courses is made up of those subjects required for proficiency as first, second and third class technicians of the Medical Department and for qualification as assistants to flight surgeons.

The school year comprises two complete courses of four months each for medical officers and two courses of three months each for enlisted men. When a medical officer successfully passes the course of instruction, he is granted a diploma of graduation as a flight surgeon. An enlisted man receives a certificate as a specialist after completion of training.

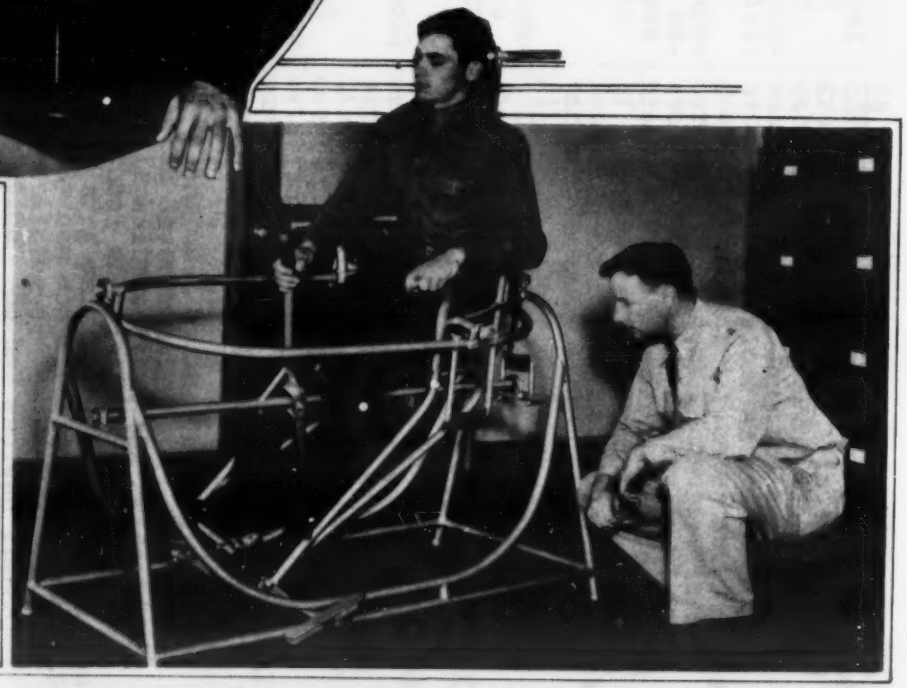
The basic course for medical officers is presented by means of lectures, demonstrations and practical work. From a medical standpoint the subjects include eye, ear, nose and throat conditions; physical diagnosis as it relates to the general examination of the body; physiology, especially as related to altitude; various tests for equilibrium; cardiology, the study of heart and blood vessels; psychology and psychological testing methods; psychiatry, the recognition and treatment of mental disorders; neurology, the normal and abnormal responses of the nervous system; administration, with special reference to Medical Department and Air Corps relations, the set-up and conduct of the flight surgeon's office and of the station hospital; Air Corps accidents and their care; the duties of the flight surgeon in the selection, care and maintenance of the flier. Instruction further includes lectures by Air Corps officers in meteorology, theory of flight, avigation and maps, Air Corps officers' organization, all phases of heavier-than-air and lighter-than-air aviation, and flying cadet regulations and instruction. In addition, medical officers are given ten periods of flying instruction and observation on the flying line.

The training demonstrations embrace the various techniques of the entire physical examination for flying, the Henderson-Pierce rebreather showing the effects of oxygen want, the Barany chair for vestibular equilibrium, the flight surgeon's portable examining unit, the electrocardiograph for heart tracings, the audiometer for hearing tests, the reaction time machines, the motor and airplane ambulances, the Link Trainer, and the packing and care of parachutes. The classes are taken early on an orientation trip over Randolph Field; later, visits are made to the flying cadet area, Air Corps Supply, the Air Corps Shops at Duncan Field and the Kelly Field Hospital. Clinics in cardiology are held at the Station Hospital, Fort Sam Houston, and in psychiatry at this hospital and the San Antonio State

School of Aviation Medicine

LAMP STUDY OF THE ANTERIOR SEGMENT OF EYE.

RESEARCH IN BEHAVIOR USING PHOTOPOLYGRAPH



EQUILIBRIUM TEST USING THE BALANCING CHAIR

Hospital.

Medical officers are given practical work on the different instruments of precision used in the examination of applicants and others for flying training, and are assigned groups of enlisted men for unofficial examinations. This gives them preliminary basic experience before they are permitted to assist in the examination of the classes reporting for flying training. It is the intent of the School to give as much practical work as possible, so that the student will be thoroughly qualified to conduct the physical examination for flying when he reports to his Air Corps station or other assignment.

Since the inception of the Medical Research Laboratory in 1918, the School has constantly carried on research along varied lines. Much of our knowledge of the altitude effects on the human organism has been gained from work done at this School. The pioneers in blind (instrument) flying worked in close collaboration with our medical personnel to determine the physiological background for the disorientation experienced in blind flying. A great amount of study has been devoted to reaction times to differentiate the degrees of reaction as related to potential flying ability and possibility of graduation. In the Psychic fields investigation has covered traits and abilities which might be related to success or non-success in learning to fly. Considerable thought has been given to the reaction of the cardiovascular system under stress and strains and the effects of emotion. Investigations have been made on the sensitivity of the eye to varying degrees of darkness. Color vision has received attention. The problem of proper goggle construction, fit, and lens inserts has been an important one. The School maintains a lens grinding department which makes tests, experimental and special lenses needed by pilots. Revision of the examining technique is always a consideration. Thousands of past examination records are available from which repeated and overlapping physical and psychic abnormalities present a key to the possible failures in learning to fly. Many other research problems have been solved, or discarded, or are in the process of solution.

Research to be conducted properly by flight surgeons, and especially if it is to amount to anything of scientific value, requires regular and frequent flying on the part of flight surgeons.

The Extension Course given by the School of Aviation Medicine to medical officers of the Regular Army, Navy, Orgainzed Reserve, National Guard and Naval Reserves includes, in so far as possible, the didactic work which is taught at the School. At present there is an enrollment of 400 officers. The correspondence papers are corrected and graded by the different instructors in each subject. The completion of the extension course does not entitle the student to a diploma as a flight surgeon, but to a certificate covering this portion of the work. However, if the student obtains permission to take a practical training course for a period of six weeks at the School of Aviation Medicine, or one of its subsidiaries at March or Langley Field, he receives a flight surgeon's diploma.

It is to the credit of the School that a very large percentage of the medical examiners for the Department of Commerce are graduates of it. They took the course either on active status as Medical Reservists or at their own expense. For many years every Medical Director of the Department of Commerce has been a graduate of the School of Aviation Medicine. Furthermore, it numbers among its graduates the Medical Directors of the larger commercial lines. Our methods of examination are now being used by the Philippine and Mexican Governments.

It is believed that the graduate of the School of Aviation Medicine, the flight surgeon, during the years of his activity has contributed immeasurably to the upbuilding of the personal factor in aviation. He has evolved standards of examination which are a secure basis for physical and mental efficiency. He attempts to turn over to the Air Corps only those men with the very best physical qualifications available; it is indeed seldom that a man fails in flying because of physical reasons alone. Among the older pilots, of course, physical and nervous upsets may crop up with the years, but it is the duty and desire of the flight surgeon to find and care for them in their incipiency.

A new era in aviation is fast approaching. Large, multi-motored ships, manned by crews and flying at greater altitudes are phenomena of the present day. Substratosphere flying may become a common occurrence. The construction of ships with sealed cabins, in which the barometric pressure at sea level is simulated, will allow the occupants to exist as comfortably and safely in the rarefied atmosphere of great altitudes as they do on the ground. All this involves not only intricate engineering details but many physiological problems as well. The Physiological Research Laboratory at Wright Field, in charge of a flight surgeon, is conducting studies on physiological requirements for sealed high-altitude enclosures and on numerous other projects which affect the health and safety of Air Corps personnel.

The Department of Commerce is developing a laboratory at Kansas City, directed by a flight surgeon, to study pilot

fatigue and other problems to make flying more comfortable and safer. Commercial airlines employ flight surgeons as medical directors. The Aero Medical Association and its organ, the Journal of Aviation Medicine, organized by flight surgeons, contribute their part in developing factors guaranteeing safety to the public and pilot, and cooperate to the fullest extent with the Army, Navy, Department of Commerce and commercial air transport companies. The medical departments of the several branches of the Government, Army, Navy and Department of Commerce, are established institutions that play a major part in aeronautical achievement.

With the forward advance of aviation and its subjection of man's bodily economy to new stresses and hazards, it is evident that the medical man, the flight surgeon, must keep pace. His contributions will add as much to the future progress of aviation as they have in the past.

Altogether, 482 officers have been graduated as flight surgeons, viz:

Regular Army	218
Reserve Corps	180
National Guard	31
United States Navy	45
Foreign	8
Total	482

The above figures are as of March 31, 1939.

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Development of Combat Aviation in U.S.
(Continued from Page 29)

airplane. Because of the difficulty in mastering the intricacies of the modern airplane and the scientific aids to aviation, it now takes from two to three years properly to train a military pilot.

Efficiency at the beginning of hostilities is the nature of the capability of the GHQ Air Force. We must divorce from our minds the idea that the GHQ Air Force in times of peace can be a "nucleus" for wartime expansion. It is no longer possible suddenly to expand an air force in an emergency by calling in all of the Reserve flyers and all of the commercial and private airplanes for war service. Years, not months, are required to train a military pilot; years, not months, are required to equip units with "drawing board" airplanes. The GHQ Air Force, like the Navy, must be an M-Day force. Its effectiveness lies in what it can do tomorrow morning with the equipment and personnel of today.

Note: This is a revision of an article "Development of Combatant Aviation in the United States Army," by Colonel Frank M. Andrews, then Major General, Air Corps, for the Jubilee Issue of the Army and Navy Journal, July, 1938.

PROPHETIC VISIONS OF A PIONEER FLYER

Poring over the pages of an aeronautical magazine published over 22 years ago in search of data on records established in aviation in its early days, we chanced to run across an article by one, Burton J. Hendrick, setting forth an interview he had with Mr. Orville Wright.

In the light of present-day aircraft developments, Mr. Wright's views as then expressed are of particular interest, and certain portions of the interview are quoted below, as follows:

"I really believe that the airplane will help peace in more ways than one - in particular I think it will have a tendency to make war impossible. Indeed, it is my conviction that, had the European governments foreseen the part which the airplane was to play, especially in reducing all their strategical plans to a devastating deadlock, they would never have entered upon the war..

Most of us saw its use for scouting purposes, but few foresaw that it would usher in an entirely new form of warfare. As a result of its activities every opposing general knows precisely the strength of his enemy and precisely what he is going to do. Thus surprise attacks, which for thousands of years have determined the event of wars, are no longer possible, and thus all future wars, between forces which stand anywhere near an equality, will settle down to tedious deadlocks. Civilized countries, knowing this in advance, will hesitate before taking up arms - a fact which makes me believe that the airplane, far more than Hague conferences and Leagues to enforce peace, will exert a powerful influence in putting an end to war.....

My main interest is in the airplane as a real promoter of civilization. Recent events have made us regard it almost exclusively as a weapon of war. Probably many people believe that, as soon as peace is signed, the thousands of airplanes that have contributed so greatly to it will be scrapped. That is not my belief. After the war we are told we shall have a new world and a new type of civilization; in my opinion one of the factors that will contribute to this changed order will be the part which will be played in it by the airplane. We shall have an entirely new form of transportation, which will serve many ends and contribute in many ways to the welfare and happiness of mankind.....

I do not believe that all transportation in future will be through the air. The airplane will not supplant the railroad, the trolley car, or the automobile. All our present methods of transporting passengers and freight will continue to render excellent service; the airplane will merely be ano-

An Army Air Corps "Flying Fortress" at the Monument to the Wright Brothers at Kitty Hawk, N.C.

ther agency for performing a similar kind of work. There are certain things that it will do better than the railroad or the automobile, and its use will therefore be limited to these, for we must realize at the start that the airplane has decided limitations. In saying this I am discussing the machine as we know it today. It is not impossible that other forms of aircraft, built upon other principles, may be invented, which may accomplish all the wonderful things certain imaginative people prophesy for the present airplane.....

In a very few years, I think, the flying machine will do all the work that the special train does now. It is not only faster, but it is more comfortable, much safer, and much less expensive. The New York business man who wishes quick transit to Chicago, where the saving of a few hours will perhaps mean a successful business deal involving millions, will use the airplane. So will the man who wishes to reach the bedside of a sick relative, where saving an hour or two may mean seeing his wife or child alive. We frequently read of surgeons being rushed upon a special train, so that they may arrive in time to perform an operation that may save a human life. What a godsend the speedier transit of a flying machine will be in cases like this!.....

I have mentioned the scarcity of good landing places. It will be necessary to establish such landing places - that is, smooth, level fields - at all important points....All large cities will have to build such accommodations; future municipal planning will necessarily provide them. With these established in all important points, the day of passenger traffic will begin. This service can supplement the regular railroad in numerous ways.....Perhaps the greatest service of the passenger airplane is that it will make accessible parts of the world that are now little used. There are plenty of places where railroads cannot be built because of the great cost, because of engineering obstacles, and because there is not enough traffic to justify them.....

The present type of machine will never supplant the freight-car, and I cannot foresee that it will ever be used for carrying coal or wheat. But in transporting special small packages, precious freight, it will be extremely useful.....The airplane will probably be one of the most potent agencies in the development of Alaska, for here we have an extremely rich country where railroads are difficult and extremely expensive to build.....

I do not think it (the airplane) will supplant the steamship and the railroad as a mail carrier, because it will be too expensive. It would take a very large number of flying machines, perhaps a hundred, to carry as much mail as we now get into a mail car. You can easily figure how this would increase the expense. It will have the same advantage in carrying mails as in carrying passengers, and that is speed.....But we shall probably have a special rapid mail service by airplane, for which we shall pay a higher price and buy a special stamp. The flying machine will give a ten-hour service between New York and Chicago and a two-day service from the Atlantic to the Pacific. It will likewise carry letters into remote sections which the mail now reaches only at long intervals or does not reach at all."

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IN REMEMBRANCE OF AN AVIATION PIONEER

At the regular meeting of the Board of Directors of the Ronald Press Company, held on June 14, 1939, the following resolution was unanimously adopted:

In Memory of
Charles deForest Chandler

The members of the Board of Directors of The Ronald Press Company, by this resolution, wish to record their deep sense of loss in the death, on May 18th, of Colonel Charles deForest Chandler, Editor of aeronautic publications of this Company.

From 1901 until 1920 Colonel Chandler served in the United States Army, in the United States, the Philippines, Mexico, and France. He was closely identified with Army flying from its inception. As chief of the aeronautical division of the Army Signal Corps, he was commander of the first Army Aviation School. In the World War he was chief of the balloon section of the American Expeditionary Forces. He received the Distinguished Service Medal of his own country and was an officer of the Legion of Honor of France.

From 1925 until the time of his death he was Editor of the publications of The Ronald Press Company in the field of aeronautics. In that capacity he brought into being the first Aeronautic Library published in America and carried it forward to the completion of more than twenty-five volumes, an achievement in the field of professional literature as constructive and distinguished as his military service.

By his ability, modesty, courtesy and personal charm he endeared himself to all those who worked with him in this Company over a period of fourteen years.

It is directed that a copy of this resolution be sent to the members of his family, to the Institute of Aeronautical Sciences, of which he was a founder-member, and to certain of his closest friends and associates in the field of aeronautics.

V-8110, A.C.

PROCEDURES IN AIRCRAFT PROCUREMENT FROM ESTABLISHMENT OF TACTICAL TYPE TO DELIVERY OF AIRPLANE TO SQUADRONS
(As of April 15, 1939)

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1. TACTICAL REQUIREMENTS
   Tactical requirements are set up based on tactical considerations and recommendations by:
   a. Office, Chief of Air Corps
   b. Tactical School
   c. Tactical Commanders
   d. Board of officers experienced in type under consideration.
2. DESIGN STUDY
   A design study is made by the Materiel Division in order to determine whether tactical requirements are consistent with current aeronautical practice and the future possibilities within a reasonable period of time. Design studies consist of:
   a. Review of existing engineering data, characteristic existing models and types, fundamental researches, and experimentation.
   b. Preparation of installation drawings.
   c. Calculations of performance characteristics and other requirements.
   d. Estimate of probable cost and time required for development of experimental model.
   (Time, approximately 6 months to one year.)
3. MILITARY CHARACTERISTICS AND DEVELOPMENT DIRECTIVE.
   a. Military Characteristic requirements are prepared by Materiel Division based on tactical and design studies. Military Characteristics cover performance, armament, equipment and crew. Forwarded to Chief of Air Corps for reference to General Staff for approval.
   (Time, approximately one to three months.)
   b. The Development Directive is issued by Chief of Air Corps to Chief of Materiel Division. Contains data additional to that set forth above and necessary to preparation of type specification.
   (Time, from 1 week to an indefinite period, depending upon complications)
4. TYPE AND GENERAL SPECIFICATIONS.
   a. The Type Specification is prepared at Materiel Division. It incorporates:
      (1) Minimum requirements in military characteristics.
      (2) Desired characteristics.
      (3) Detailed requirements such as types of engines, propellers, instruments, armament, etc.
   (Time, approximately one month).
   b. General Specifications applicable to all types exist in the Handbook of Instructions for Airplane Designers and other current related specifications.
   (These are standing publications, hence the time element does not enter in.)
5. Up to this point procedures are the same for all types of procurement. From this point on procurement may be effected by Design Competition, Experimental Procurement Without Design Competition, or Production Procurement.
   a. Design Competition
      Circular proposal is prepared to be issued to all manufacturers in accordance with the requirements of Section 10 of the Air Corps Act (Act of July 2, 1926). The terms of the proposal are based on the Type and General Specifications noted above.
      (1) Bids are called for on:
         (a) Preliminary design consisting of specification, drawings, performance calculations, balance diagrams, and weight calculations.
         (b) Detailed design and construction of experimental airplane including detailed specifications, drawings, group weight statement, and balance data.
         (c) Construction of static test airplane.
         (d) A specified number of airplanes.
      (2) Winner of preliminary design may be given contract with option calling for detailed design, or construction of an experimental airplane based on detailed design, or other options.
      (Time, a minimum of approximately 90 days).
      (3) A Board of Officers is appointed by the Secretary of War to make a study of designs submitted in response to circular proposals, and based on this study award is made to winner of competition.
      (Time, about 1 to 2 weeks).
      (4) Skeleton airplane for static test and stress analysis offered. Construction of experimental article started.
      (The static test and check of stress analysis and engineering data are accomplished by Materiel Division during the actual construction of the first airplane. Necessary

changes and improvements are made during construction.)
(Time, approximately 8 months to 1 year).

(5) Airplane flown by Trial Board for determination of tactical suitability.
(Time, 1 to 2 weeks).

(6) If favorable report is submitted by Trial Board, contract is entered into for procurement of a specified number of airplanes for test by the Air Corps Tactical Units to determine suitability for planned military purposes.
(Time, approximately 9 months to 1 year).
These tests are referred to as Service Tests.
(Time, approximately 1 year).

b. Experimental Procurement Without Design Competition.

(1) Direct procurement of airplanes referred to above is also authorized without competition under paragraph (k), Section 10, Air Corps Act 1926, wherein the Secretary of War may, at his discretion, purchase by contract or otherwise such aircraft as may be necessary for experimental development purposes.

(2) Such procurement by direction of the Assistant Secretary of War is limited to the minimum number of airplanes required for experimental and service test purposes.
(Service test quantities usually consist of 3 to 13 airplanes.)
(Delivery of first airplane approximately 10 months to 1 year after issuing of contract).

(3) This method is employed in the case of an original design, the patent rights for which would preclude securing competition from other designers, or in case secrecy of plans and engineering design details are required.

c. Production Procurement

Production procurement is accomplished by the issue of circular proposals to the entire aircraft industry, describing specification requirements, method of evaluation to be employed, and calling for unit price bids. The submission of a physical airplane is also required under this form of procurement (unless the bidder offers an airplane substantially identical to one heretofore available for test by the Government, in which case the Government may waive the requirement). Circular proposal and Type Specifications are forwarded through the Chief of the Air Corps to the Assistant Secretary of War for approval.
(Advertised a minimum of 90 days before opening of bids.)

(1) Model delivered at Materiel Division undergoes:
  (a) Full engineering inspection.
  (Time, 1 to 6 weeks).
  (b) Full flight and performance testing.
  (Time, 3 to 8 weeks).
  (c) Study of model undertaken by Evaluation Board.
  (Time, 3 to 10 days).
  (d) Recommendations forwarded to Chief of Air Corps for reference to General Staff and Secretary of War.
  (e) Upon approval of the Secretary of War, award of contract is made, and procurement entered into for a production number of airplanes necessary for the supply of Tactical Units. The airplane is then considered as an Air Corps Standard.

6. The above development of an airplane type or model requires from 2 to 5 years.

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EARLY CONCEPTION OF MILITARY AIRPLANE

The following extract is quoted from the report of the Chief Signal Officer of the Army for the Fiscal Year 1910:

" * * * Furthermore, experienced military airmen cannot be created after war is declared, and the demands of this new service will undoubtedly require higher qualities of training, judgment and courage than any other branch of the military service. Military authorities agree that the only way to meet aerial attack is by similar weapons, and that there is no chance of adequate protection being given locally. The advent of aerial navigation has, in fact, extended the vulnerable area of a country to every acre of its territory."

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ACKNOWLEDGMENT

The News Letter expresses deep appreciation to the Materiel Division personnel who executed the work incident to the lay-outs, photography, and printing by the offset process of the attractive illustrated inserts featuring this issue which is published in commemoration of the thirtieth anniversary of the purchase of the first Army airplane. The News Letter has always met with a ready response to all requests made upon the Materiel Division personnel on various occasions for assistance in connection with cover designs and other features. Such cooperation is very heartening.
V-8110, A.C.

Our Army Air Corps and Its Future
(Continued from Page 4)

in the training program. A plan was therefore evolved for giving primary training at qualified civilian flying schools. This primary training will consume three months. The students who successfully complete this course will then be transferred to Randolph Field for basic training of three months' duration. The last three months of the nine months' course will consist of advanced training at Kelly Field, following which the coveted wings will be presented the graduates. Specialized training will then be given to these new flyers in the various tactical organizations to which they will be assigned. While the course has been reduced from one year to nine months, the same high standards will be maintained. Only the number of hours of certain phases of the course will be cut down, and it will be the function of our tactical units to complete the specialized training. The civilian schools selected for primary instruction purposes are excellent, and their instructors are entirely competent.

By June 30, 1940, we shall have enlisted an additional 25,000 men. We shall give two-thirds of them specialized training. Another branch of the Air Corps Technical School is being established at Scott Field, Ill., where a basic course will be given these men prior to their pursuing more advanced courses at Chanute and Lowry Fields.

As personnel and new airplanes become available, we shall form new tactical units. Approximately fifty new squadrons of all types will be organized during the expansion, at the conclusion of which we shall have a total of 13 Bombardment Groups of the heavy, medium and attack types, and 9 Pursuit Groups of the single-engine, interceptor and fighter types.

It is impracticable to operate all the additional new planes from our bases now in existence. We therefore plan to construct five new bases for this purpose, located as follows: one each in Alaska, Northeast United States, Southeast United States, Puerto Rico and Panama.

It is quite obvious that the average citizen is convinced that the terms "Air Power" and "Air Force" refer to conditions which now obtain throughout the world. It is our solemn trust to see to it that the training of individuals and units will insure a high state of air discipline and efficiency. Our new officers, Regular and Reserve, joining from the Training Center, must complete their training in our tactical units so that they will be absorbed smoothly into these units, each performing his part competently and industriously. We must not permit deficiencies in training to mislead us as to the efficacy of air power and the accomplishments of air forces.

We have come a long way during the past thirty years. Who ever thought in the early days that fighting planes would fly at 500 miles an hour; that Bombers would weigh thirty tons and carry five tons of bombs for eight thousand miles; that single engines would develop two thousand horsepower or that aerial cameras could make clear photographs through layers of clouds; or that instruments could be developed making possible accurate area bombardment on localities obscured by clouds or fog; that combat crews could ride in airplanes in the substratosphere, sealed in pressure cabins with the warmth, comfort and oxygen and pressure equivalent to earth level temperature? Yet all these things, through the nightmarish fantasies of yesterday, are the successful experiments of today and will be the mass production actualities of tomorrow.

The Air Program of our Commander-in-Chief will be brought to a successful conclusion, and this will mean that we have made the first stalwart step in providing a reasonable air defense for our country.

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OUR COVER PAGE

The artistic and very attractive cover page featuring this commemorative issue of the News Letter was designed and drawn by Mr. Frank Dunnington, draftsman of the Air Corps Information Division. Mr. Dunnington has drawn many News Lette cover designs in the past, but it is believed his latest effort tops them all

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